SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. XLIX.—No. 20. [NEW SERIES.] NEW YORK, NOVEMBER 17, 1883. [$3.20 per Annum. [POSTAGE PREPAID.]

UNITED STATES SCREW STEAM CRUISER ATLANTA.

During the last session of Congress the construction of the smaller of the two cruisers provided for in the act of 1882 was reauthorized, and in addition two cruisers of about 3,000 tons displacement and one dispatch boat, for which $1,300,000 were appropriated. Mr. John Roach, of Chester, Pa., the lowest bidder, obtained the contracts.

According to the act of Congress, these vessels were to be "constructed of steel, of domestic manufacture, having as near as may be a tensile strength of not less than 60,000 pounds to the square inch, and a ductility in 8 inches of not less than 25 per cent."

We present, on this page, an engraving of the single screw steam cruiser Atlanta.

The contract price for the hull, machinery, and fittings, exclusive of masts, spars, rigging, boats, etc., was $618,000.

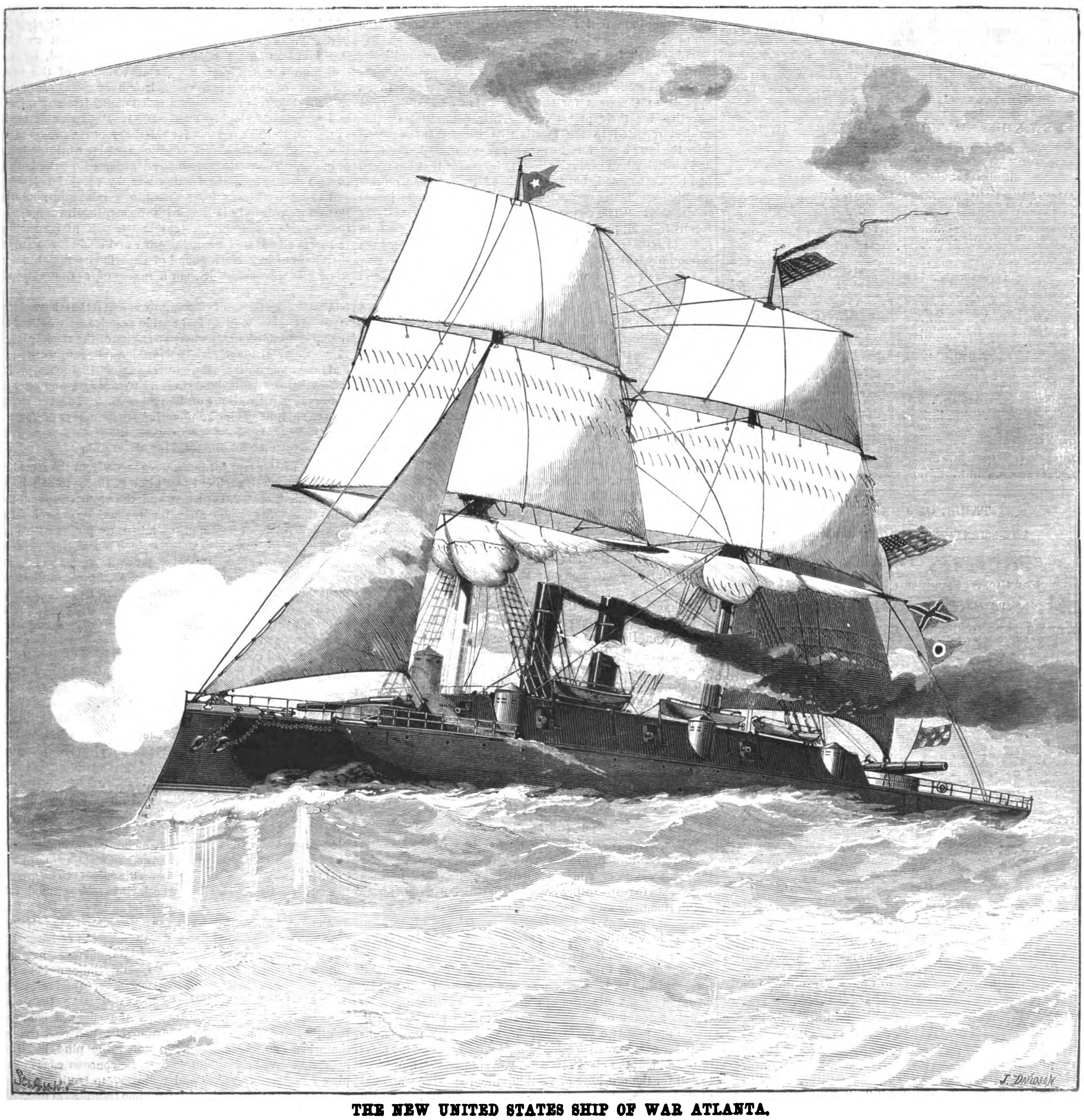
This steamer will have the following dimensions:

Length between perpendiculars	270	feet.
Length on water line	276	"
Length over all	283	"
Depth from garboard strake to under side of superstructure deck	34	"
Height of main deck port sill from load water line	11	"
Free board at extremities of superstructure	9	"
Breadth—extreme	42	"
Draught at load water line, mean	16 feet 10 inches.	
Displacement at water line	3,000 tons.	
Area of plain sail	10,400	square feet.
Complement of men	280	"
Battery, four 8-inch and six 6-inch B. L. R.		
Indicated horse power	3,500	
Sea speed	13	knots.
Capacity of coal bunkers	580	tons.

There will be eight complete transverse bulkheads extending to the main deck, dividing the vessel into nine main compartments, one of which is occupied by the engines. Longitudinal bulkheads will extend on each side throughout the machinery space, forming side coal bunkers, which afford a coal armor of about 8 feet in thickness above the water line and an average thickness of about 5 feet below it. The coal bunkers will have a capacity of 580 tons, but nearly 200 tons more can be safely carried, thus giving an endurance of 2,500 miles at full speed and 5,300 miles at 10 knots an hour.

The vessel will be divided into seventy-three water-tight compartments, and great care has been exercised in arranging the openings in order to make them really water-tight, the doors being arranged for manipulation either from below or from the main deck.

(*Continued on page* 308.)



THE NEW UNITED STATES SHIP OF WAR ATLANTA.

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 261 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year postage included..... $3 20
One copy, six months postage included 1 60

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at $3.20 each; additional copies at same proportionate rate. Postage prepaid.

Remit by postal order. Address

MUNN & CO., 261 Broadway, corner of Warren street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5 00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year postage free, on receipt of *seven dollars*. Both papers to one address or different addresses as desired.

The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, $5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. ☞ Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

NEW YORK, SATURDAY, NOVEMBER 17, 1883.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 411,

For the Week ending November 17, 1883.

Price 10 cents. For sale by all newsdealers.

A CENTENNIAL COTTON EXHIBITION.

About a year ago the Cotton Planters' Association of America began to agitate the question of holding a grand Centennial Cotton Celebration, at New Orleans, in December, 1884. The first bale of American cotton ever exported was shipped to England in 1784, hence the significance in having such exhibition next year. But the idea has since grown into a world's fair project, on a larger scale than was even the Philadelphia exhibition of 1876. The main building, as determined upon by the Directors, will cover an area of one million square feet, or 15 per cent. more than was occupied by the principal structure at Philadelphia, and, although it is yet too early to say definitely whether the project will be generally popular enough to insure a brilliant success, on the elaborate plan contemplated, it is certain that, in the Crescent City and throughout the south, as well as in many of our manufacturing centers, the idea is received with much enthusiasm, and warm promises of hearty support are made.

ADULTERATIONS—WHAT THE WHOLESALE DRUGGISTS SAY.

Nearly every special line of business of any prominence now has its trade association or organization, for the purpose of discussing matters of common interest and endeavoring to secure united action therein, and also for friendly social intercourse in their more or less frequent gatherings. The National Wholesale Druggists' Association is one of the most considerable of these organizations, and, at its annual convention, held in New York October 17–19, nearly two hundred delegates were present, all sections of the country being represented. This association is now in the seventh year of its existence, and represents a department of trade amounting to more than $100,000,000 in the commerce of the country.

This association has always taken advanced ground in its treatment of the matter of adulterations and sophistications, in food as well as in medicines, and has been urgent in its appeals to Congress for such legislation as shall be most effective for their prevention. Their committee on this subject reported to the meeting its belief that the reason why the laws heretofore to prevent the adulteration of food and medicine had generally been failures was that too much had been attempted, but the spirit of the members on this question was better expressed by the President, who in his report said: "The commercial honesty which instinctively recoils from all profit made by selling adulterated goods in place of pure is equaled only by the life and health of the community which it seeks to guard."

A delegate was also present from the American Pharmaceutical Association, and in his remarks indorsed the statement that it was "dishonorable and criminal knowingly to buy or sell adulterated articles that are used as medicinal agents upon which human suffering and life depends." Not the least of the benefits, therefore, to be realized by this association of the druggists, is the great influence which its declarations against adulterations must exert in shaping future legislation.

BEARINGS AND FRICTION.

A bright and well-known mechanic insists that on his swiftest moving journals he obtains the best results with cast iron on cast iron, and he is willing also to depend on an emery-ground fit. Another, perhaps equally authoritative, says that for exceptionally high speeds, as 4,000 revolutions per minute, cast iron and cast iron are inadmissible, but he employs untempered steel and hard Babbitt metal well hammered into the box and then bored out. He tried hardened steel boxes and soft steel spindle for that speed, and found that the boxes cut so rapidly as soon to destroy the spindle as well as the boxes. For heavy weights and large journals there appears to be nothing that gives better satisfaction than good Babbitt boxes hammered solidly. Cast iron boxes with wrought iron or steel spindles have done well where the weight and speed are not excessive. All soft metal bearings, as Babbitt or composition, ought to be protected from the grinding influences of dust, but cast iron, if kept well oiled, soon forms a glaze that is almost indestructible. In all cases the journal should give space enough for a film of oil, especially for high speeds under which it may become heated and slightly expanded. Many journals and boxes are injured by binding, the consequence of a too finical fit.

COTTON SEED OIL.

When Mr. Edward Atkinson, at the time of the Atlanta Cotton Exhibition, made a most able argument to show the great wealth certain to come to the Cotton States when they began to really utilize cotton seed, which had theretofore been principally a waste product, many people were really surprised that resources for such prosperity already to hand had not previously been employed. This was two years ago, when a good deal of cotton seed had been crushed, the oil marketed, and the oil cake sold to planters for feed and for fertilizing purposes. There has since been a large increase in the manufacture of cotton seed oil, with a proportionate amount of oil cake offered to the planters, with whom the past two years have been the most prosperous probably ever known in the South. But it seems that the users of the oil and the oil cake are not yet sufficiently numerous to call for the crushing of anything like the whole amount of seed grown. The last year's production of oil has been not far from 500,000 barrels, with the result that the price has fallen from 65 to 45 cents a gallon, and the crushers are complaining that the business is unprofitable and largely overdone, although they have not been crushing one-half of the amount of seed actually available. One part of Mr. Atkinson's programme, however, contemplated a large increase in the number of cattle raised in the South, to be fed with the oil cake. This could come about only gradually, of course, but crushers are not likely to furnish oil cake unless they can profitably market the oil, and the probabilities seem to be that it will be some time yet before there will be enough call for cotton seed oil in the world's markets to result in the utilization of all the cotton seed. The demand for the oil has been steadily growing, but its properties, and the uses to which it can be put in our industries, are now pretty generally understood, so that nobody looks for a "boom" in this line.

PRESENT STEAM ENGINE PRACTICE.

It is generally believed that the improvement in steam engine economy that has been made within the last fifteen or twenty years has been owing mainly to the introduction of high speed practice—that all, or most of the increase of power for diameter and stroke of cylinder and piston, and most of the economy in fuel, are due to the increased piston speed. To some extent this is true; but it is also true that engines are built on better plans and under the guidance of better mechanical judgment than was formally possible. Much of this improvement is to be attributed to the increasing use of the indicator, which not only points out the faults of the engine, but designates the reason and thereby suggests the remedy. The head of a large engine building establishment recently pointed out a discarded engine in the setting-up department which was in perfect order, and which eighteen years ago was a type of the best style of horizontal stationary engines then in use. When running it had a piston speed of 450 feet, and developed, by the indicator, about 100 H. P. Another engine of the same diameter of piston and same length of stroke, of the modern style, was running at a speed of 490 feet per minute and yet was developing nearly 200 H. P.—twice as much as the other. The reasons for this difference were several, that of 40 additional feet of piston speed per minute being only one. The modern engine had generous ports, both of ingress and egress; the friction was, by careful balancing and exact workmanship, reduced to a minimum; all the thrusts were exactly in line, with no canting leverage; and the journals, crank pin, weight and length of connecting rod were all adapted one to the other and made for the work they were to do. Not a pound of superfluous metal, not a suggestion of a makeshift, nor a fancy of a draughtsman could be found on the modern machine.

Another instance of the improvements that have been made in engine building and engine practice was noticed at the same establishment, where an engine of the modern type, 11 inches by 21 inches, was performing all the work that had been done until recently by an engine 18 inches by 36 inches that was built about seventeen years ago, and yet was not requiring two-thirds of the fuel used to furnish steam for the old time engine running the same number of hours.

SOME CURIOSITIES OF STEEL.

Eight master taps, or hobs, were made from the same bar of four-inch steel, each cut to a pitch of three to the inch, each scored, heated, hardened, and drawn to temper at the same time. Six hours after the tempering one of them "exploded," or at least cracked into three pieces with a report. The fractures give to the trained mechanical eye the appearance of good steel, and show no water cracks or other evidence of previous fracture. At the same establishment where this breaking occurred, one of its most important departments is the production of taps, reamers, dies, and similar tools. It has been abundantly proved that forged taps and reamers are inferior to those made direct from the sized commercial bar, not only in their resistance to torsion, but in the retention of their integrity under the exactions of hardening and tempering; the best taps are those which are turned direct from the bar.

There seems to be a tendency of forged steel, under certain forms, to return to the shape of the original bar. This is shown especially when the forging from a square bar is flattened. Sometimes a flattened piece will curve in the hardening as though its fibers had been stretched, and, when relaxed by the heat and again placed under tension by the cooling process, contracted toward the original condensed square form. A singular example was noticed recently. A plug gauge two and five eighths inches wide and one and three-sixteenths inches thick was forged from a square bar, finished, and hardened. After hardening it was to be ground to exact size by a corundum wheel, when the ground side immediately swelled in the center almost enough to be seen by the unaided eye, but was quite apparent with the straight edge. The other face, from which the skin of hardening had not been removed, remained straight, but as soon as that had been ground it acted just as the other did and both the side faces were swelled, and so much so that the increase in thickness by the micrometer gauge was more than one-hundredth of an inch. On treating the edges a contrary result was produced; each edge face became concave, so that when the grinding was completed the plug had two opposite convex sides and two opposite concave edges. The plug was then annealed and redressed to truth; then rehardened and reground with the same results as at first. A second time it was annealed, trued, and then case-hardened,

but even then it continued its perversity, and it is to be kept as a curiosity as it is, unless it is decided to saw it in two to inspect its interior.

The most vexatious thing about these "queerities" is that no theory that bears the test of practice has, so far, accounted for them. If the "reason why" could be discovered the causes could be removed and the working of steel be made an exact and certain art. Still, there has been great progress in this direction during the last twenty years; the percentage of loss in hardening and tempering steel has been reduced to a very low figure. These improvements have been owing to the greater uniformity in the character of the steel produced as well as to the greater skill in its after manipulation. We may not despair of yet being able to make the production of hardened steel articles as even and certain as those from any other material.

A NEW TREATMENT FOR THE DEAD.

The question of cemeteries interests the public more and more, and in view of its hygienic relations has been discussed by scientific societies, legislatures, and municipalities. M. Ch. Depérais announces in the *Cosmos les Mondes* a new method of treating corpses by which they are rendered innocuous.

To day a feeling generally prevails that the cemeteries are centers of infection for the diffusion of epidemic maladies, and that their neighborhood is a menace by reason of their emanations and their influence upon percolating waters. This hurtful influence has long been recognized. In India the natives yet expose their dead upon the banks of the Ganges or at the summit of the Towers of Silence. They become a prey in both instances to rapacious animals, and become partially harmless through their destruction.

The Jews, Etruscans, Ethiopians, Greeks, and Romans had recourse to embalmment or incineration. Cremation fully satisfies the requirements of modern sanitation. The embalmment as practiced to-day demands cares and expenses which are never applied, and it has been shown that the chemical bodies employed are insufficient to destroy all the sorts of germs, spores, bacteria, etc., which arise. It only momentarily protects the body.

The process of embalmment among the Egyptians was long and complicated. It was based upon the use of reagents and upon drying in the air or in furnaces. Cremation as at present executed is completely satisfactory, every atom of noxious gas even being consumed. Nevertheless, the feelings of most people are opposed to it, and there are practical difficulties connected with it not always easily overcome.

It seems therefore necessary to find a new method which, while it guarantees the destruction of the causes of infection, conciliates our customs and desires and is reasonable in its expense. M. Depérais has explained a process based on the fact or statement that at 106° Cent. these pernicious germs are destroyed. He utilizes the well known fact that saline solutions do not boil until after the boiling point of water (100° Cent., 212° F.) has been passed. The salt he employs is the chloride of calcium, on account of its cheapness, the ease of its management, and because it is antiseptic and tanning in its effects. Plunging a corpse into such a solution at 47° Baume and slowly raising the temperature of the bath, it is evident that when the temperature passes 100° Cent. the water of the flesh and tissues will evaporate.

Continuing the heat, the body contracts and the chloride of calcium impregnates it. The prolonged bath kills the disease spores, and the hardening and antiseptic properties of the salt partially embalm the body; as, however, chloride of calcium is deliquescent, the body would not dry on removal from the bath. It is removed by immersion in a bath of sulphate of soda, by which the lime salt remaining in the body and incrusting all its fibers becomes the sulphate of lime, and the chloride of sodium is free in the bath. Then the body is dried either in the open air or in an oven.

OSAGE ORANGE VS. MULBERRY FOR THE SILKWORM.

There is a strong disposition on the part of those who look for making money by the propagation and sale of mulberry trees to underrate the use of Osage orange as silkworm food. We have thoroughly demonstrated by the most careful tests on several occasions that when *Maclura aurantica* is properly used for this purpose, the resulting silk loses nothing in quantity or quality, and we have now a strain of *Sericaria mori* that has been fed upon the plant for twelve consecutive years without deterioration. There is, perhaps, a slight loss of color, which, if anything, must be looked upon as an advantage. It is more than likely, however, that the different races will differ in their adaptability to the Maclura, and that for the first year the sudden transition to Maclura from Morus, upon which the worms have been fed for centuries, may result in some depreciation. Mr. Virion des Lauriers at the silk farm at Genito has completed some experiments which he details in the opening number of the "Silk Grower's Guide and Manufacturer's Gazette," on the relative value of the two plants. Four varieties of worms were reared. The race known as the "Var" was fed throughout on mulberry leaves. The "Pyrenean" and "Cervennes" worms were fed throughout on leaves and branches of Osage orange, while the "Milanese" worms were fed on Maclura up to the second moult and then changed to mulberry leaves.

At the close samples of each variety of cocoons were sent to the secretary of the Silk Board at Lyons, and appraised by him. The Maclura fed cocoons were rated at 85 cents per pound; those raised partly on Osage and partly on mulberry at 95 cents per pound; and those fed entirely on mulberry at $1.11 per pound. This, M. Des Lauriers thinks, seems to show that the difference between Maclura and Morus as silkworm food is some "twenty-five to thirty per cent in favor of the latter," while it is evident that "the leaf of the Osage orange can be used with some advantage during the *first two* ages of the worms, thus allowing the mulberry trees to grow more leafy for feeding during the last three ages." The experiment, although interesting, is not conclusive from the simple fact that different races were used in the different tests and not the same race, so that the result may have been due to race and not to food.—*C. V. Riley.*

REAPPEARANCE OF THE COMET OF 1812.

On the third of September, Mr. Brooks, of Phelps, New York, discovered a telescopic comet. Its advent was quickly made known to the scientific world, and it was described as round and faint, and having no tail. Its course was toward the earth, and it was hoped that it would become visible to the naked eye in two or three months. It was generally accepted as a new-comer making its first visit to the clime of the sun, and was known as comet Brooks, or comet *b* 1883.

Instead however of being a new-comer, this comet is an old friend that made its first recorded visit in 1812, and is known as Pons' comet from the name of the discoverer, or, more simply, as the comet of 1812. Encke, an astronomer of the time, found that the comet moved in an ellipse with a probable period of nearly 71 years, so that its return was looked for about this time.

The Rev. George Searle, of New York, was the observer who discovered the identity of comet Brooks and the comet of 1812.

Cometic astronomy was comparatively in its infancy when Encke made the computation of the orbit of this comet. It is simply wonderful that, with the data at his command, he should have reached a result so nearly accurate. Within a few years, however, two series of observations of the comet have been discovered which were unknown to Encke. Two French astronomers, Messrs. Schulhof and Bossert, undertook to recompute the orbit, using all the data known. The Paris observatory published the result of their labors in a pamphlet of 200 pages. From time to time, the enthusiastic French observers issued memoranda of the probable position of the comet when near enough to be seen. Unfortunately, the first observations of comet Brooks did not seem to agree with the French ephemeris, and it was hastily concluded that the erratic visitor was a new member of the cometic family, come to take its first peep at our little planet.

The Rev. Mr. Searle studied the question more carefully, and verified the computations more accurately. He proved beyond question that the positions marked out for comet Brooks were identical, at the time of observation with those in which a comet would be found that was traveling in the ellipse computed by Encke. He went further, using the new orbit of the French astronomers, and proving that the comet was observed in the exact position where it should have been found according to the orbit computed 70 years ago.

There is therefore no shadow of a doubt that our eyes behold the long expected comet of 1812. Its perihelion passage will take place on the 25th of January, 1884. It will then be about 60,000,000 miles distant from the earth, two-thirds the distance of the sun.

In 1812, the comet presented, when discovered in July, the appearance of an irregular nebulous mass, with the tail entirely wanting. In September, the nucleus was 5′ in diameter, and the tail was 2° 17′ in length. Though not very bright, it was distinctly visible to the naked eye, and was observed for ten weeks before it disappeared in the star depths. The returning comet, when first seen, presented similar elements. About the 23d of September, however, a remarkable and unexpected outburst occurred, the nucleus expanding into a confused circular nebulous patch of light, and the comet increasing many times in brilliancy in the course of two or three days. On the 23d, the nebulous mass was 2′ in diameter; on the 25th, it was 4′ in diameter and shone with a luster equaling a star of the seventh magnitude. The activity of the display is almost unparalleled in cometic history, and is specially noteworthy on account of the comet's great distance from the sun at the present time. Since this curious outburst, the comet has been a well behaved member of the family, but it is impossible to predict what vagary it may next indulge in.

The comet of 1812 may now be seen in the evening in the northwest in a telescope of moderate power, and is said to be visible in a good opera glass. In a few weeks it will be easily perceptible to the unassisted eye, and when the year 1884 makes its advent, it will be near its culminating point. It will not equal the superb comet of 1882 in size or brilliancy, but it will be visible in the evening sky and will be so much more convenient to observe that there will be compensation in its lessened splendor.

It is an astronomical triumph, that with the inadequate means at command for computing an ephemeris, an astronomer seventy years ago was able to predict nearly the exact time for this comet's return. Our ancient friend is winging its swift flight toward us, and before long our eyes will be gladdened by a sight of its face after a long travel of threescore years and ten, when almost every eye that noted its first appearance has ceased to behold the shining picture that nightly arches over the earth.

There are several comets with a computed period of from 70 to 75 years. Halley's comet with a period of 75 years is the only one of them that has made more than one return. Its last appearance was in 1835, and it is next expected in 1911. The comet of 1812 with a period of 71 years now records its first return. The comet of 1815 with a period of 74 years is confidently anticipated in 1889.

Clocks and Railway Time Tables to be Changed November 18.

The changes to be made on Sunday, Nov. 18, in the time by which about all the railroads in the country are run, cannot be brought about, at the best, without considerable friction. In Boston, for instance, there is no little opposition to the putting of clocks and watches back some 17 minutes, as will be necessary under the new provision for "Eastern standard" time, but orders have been issued for many of the public clocks in that city to be so regulated, and, as the whole railroad system of the Eastern States will be controlled by this standard, the prevailing opinion seems to be that the innovation will be generally accepted. There may be some who will at first carry the two kinds of time, the "standard" and the true, as can be readily done by having two minute hands on a watch: this is now frequently practiced to keep both New York and Boston time, by those who travel much between the two cities. In New York city, where the change required calls for putting back the true time only four minutes, there will probably be less opposition to the adoption of the new standard, but it may be readily conceived that great confusion will inevitably be caused wherever it is attempted to use the two kinds of time simultaneously.

Full particulars relative to the adoption of the new plan, whereby there will practically be only four standards of time throughout the country, instead of forty-nine, as at present, were published in the SCIENTIFIC AMERICAN of Oct. 13. The time tables of many of the railroads will also have to be changed, as well as the clocks, in order to facilitate the making of connections between lines affected over considerable distances east and west. The following list of changes has, therefore, been furnished by Mr. W. F. Allen, Secretary of the railroad conventions which decided upon the adoption of the new standard, the letter f denoting that the clock is to be set ahead, and the letter s that it is to be set back:

Atchison, Topeka, and Santa Fe, east of Dodge City, clocks only, 9 minutes, f.

Atchison, Topeka, and Santa Fe, west of Dodge City, clocks and schedules, 51 minutes, s.

Baltimore and Ohio (west), both clocks and schedules, 28 minutes, s.

Boston, Hoosac Tunnel and Western, both clocks and schedules, 4 minutes, s.

Boston and Albany, clocks only, 16 minutes, s.

Canadian Pacific (Eastern division), clocks only, 6 minutes, s.

Central Vermont, both clocks and schedules. 12 minutes, s.

Chesapeake and Ohio, both clocks and schedules, 8 minutes, f.

Chicago and Alton, clocks only, 9 minutes, s.

Chicago and Grand Trunk, both clocks and schedules, 9 minutes, s.

Cleveland, Columbus, Cincinnati, and Indianapolis, both clocks and schedules, 28 minutes, s.

Delaware and Hudson Canal Company, clocks only, 4 minutes, s.

Delaware, Lackawanna, and Western, both clocks and schedules, 4 minutes, s.

Fort Wayne, Cincinnati, and Louisville, both clocks and schedules, 28 minutes, s.

Freehold and New York, both clocks and schedules, 4 minutes, s.

Hartford and Connecticut Western, clocks only, 4 minutes, s.

Lake Shore and Michigan Southern, both clocks and schedules, 28 minutes, s.

Lehigh Valley, clocks only, 1 minute, f.

Louisville and Nashville, clocks only, 18 minutes, s.

Missouri Pacific, clocks, schedules at St. Louis only, 8 minutes, s.

New York, Lake Erie, and Western, clocks only, 4 minutes, s.

New York Central and Hudson River, clocks only, 4 minutes, s.

New York City and Northern, clocks only, 4 minutes, s.

New York and New England (east of Connecticut), both clocks and schedules, 14 minutes, s.

New York and New England (in Connecticut), both clocks and schedules, 4 minutes, s.

Pennsylvania, New York division, both clocks and schedules, 1 minute, f.

Pennsylvania, all divisions except New York, clocks only, 1 minute, f.

Philadelphia and Reading, both clocks and schedules, 1 minute, f.

Rome, Watertown, and Ogdensburg, clocks only, 4 minutes, s.

THE Swiss railroad companies now cover a portion of their carriages with a phosphorescent preparation, which makes them visible at night.

The Possibilities of Land Culture.

A remarkable illustration of what may be done with ten acres of land only has been furnished by a fruit planter named Dillon, of Woodland, California. Six years ago he planted five acres with Muscatel grape, since which he has added two more acres. He has also planted one acre with prunes, nectarines, and peaches. From the five acres first mentioned his gross returns last year were $1,200. Last year he planted three-fourths of an acre of beets, which yielded 35 tons. By the aid of these, and a little bran or short, he kept a span of horses and two cows seven months, besides which he sold $30 worth of beets. One of the cows yields from 10 pounds to 11 pounds of butter per week, besides the milk which the planter's small family uses. By the side of his fencing Dillon further planted 20 walnut trees, which have borne fruit for two years. From the wood cut from these trees this year in the trimmings he made a little over three cords of stove wood. Gum trees planted six years ago, and some of them 12 inches in diameter, will make when cut into wood from one-fourth to one-half a cord of wood per tree. In the condition in which he now has his fruits and vines, this enterprising grower on a small scale states that he can make a living for himself and family, and lay by from $800 to $1,000 annually. His family consists of himself, wife, and one child. It is evident that Mr. Dillon, of Woodland, California, does not allow anything within his reach to lie idle or unutilized.

Preservative Vapors.

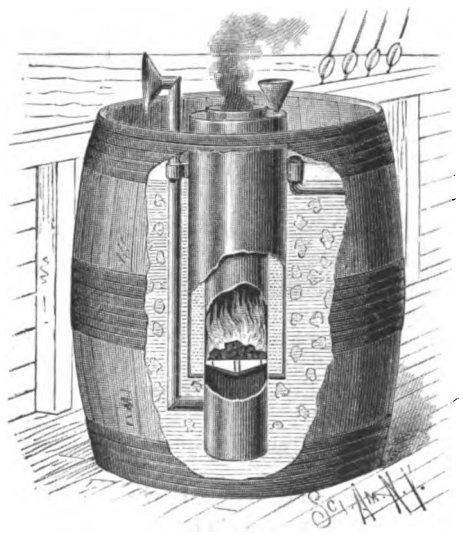
Mention is made in the *Lancet* of two small specimens of lungs, recently exhibited by a well known physician, which had been kept in chloroform vapor, untouched, in their respective bottles, for thirty-five years, and were well preserved. An illustration of the preservative power of ammonia vapor is also cited, namely, a specimen of blood which had been drawn from a sheep's neck in April, 1862, and kept in a well corked bottle ever since, and being still perfectly fresh and fluid. It is found that structures containing much fat become saponified unless chloroform is mixed with ammonia, and that, when it is desirable to retain the color of the blood, the addition to the chloroform of coal gas, which contains sufficient carbonic oxide for the purpose, is entirely successful.

Recipe for Oatmeal Cakes.

For the benefit of various inquirers Mr. S. N. Stewart gives the following recipe for the oatmeal cakes or crackers recently mentioned in our paper: To coarse oat meal, such as is here known as coarsest Akron (from Akron, Ohio), add sufficient white flour to hold it together. While dry add salt and shortening—butter is best—and rub thoroughly together; then add cold water enough to make quite soft. Let it stand half an hour, when it will have become a stiff dough. Roll very thin, cut in cakes, and bake brown in a slow oven. If fine oatmeal is used, no white flour need be added. Of course they can be made without shortening.

OIL EXTRACTOR.

A simple and efficient device for extracting oil from fish liver or blubber, and which can be used on board vessels or on shore, has been recently patented by Mr. F. Payzant, of Lockport, Nova Scotia. A cylindrical furnace is provided with a grate, below which is an ash pit. Air is admitted to the fire by a pipe entering the furnace below the grate and having its upper end, which is above the top of the furnace,

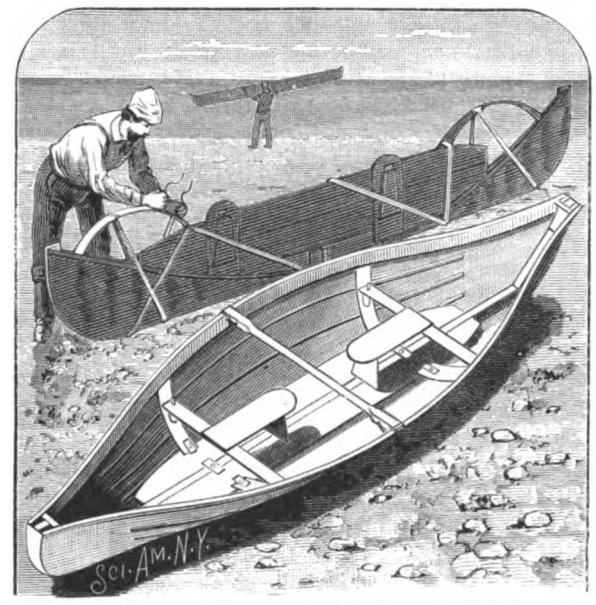


PAYZANT'S OIL EXTRACTOR.

provided with an adjustable hood for catching the air. The furnace is surrounded by a water jacket which can be filled by means of a funnel. The furnace is moved about by the aid of handles attached to it. It is placed upright in a tank, vat, or tub containing the liver or blubber, and is held in place by suitable arms. To use the extractor the jacket is filled with water and fire is started in the furnace. The heated water forces the oil from the liver or blubber and it rises to the surface, the livers sinking to the bottom of the vessel. The oil is then skimmed off, or removed by dippers, or is drawn off by means of a suitable faucet. The jacket must be kept full of water, as the direct heat from the fire will not extract the oil. The engraving represents the extractor with certain parts cut away to show the interior.

FOLDING BOAT.

The accompanying engraving presents two views of a folding boat recently patented by Mr. C. M. Douglas, of Toronto, Canada, and now being manufactured by the Ontario Canoe Company, of Peterboro, Canada. To the ends of the keelson are secured a stem and stern post braced and stiffened by blocks. The gunwales are curved like the sides of the boat, and are hinged at the ends to the stem and stern posts by shackles, so that they can be folded down when the boat is to be folded for transportation. The shell of the vessel is formed of waterproof canvas or other suitable material tacked to the gunwales and to the bottom of the keelson. Strips are tacked to the outer and inner surface of the canvas for the purpose of stiffening it. There



DOUGLAS' FOLDING BOAT.

are two or more stretchers used, which are curved in the same manner as the ribs of ordinary boats, and passed into recesses in the upper edge of the keelson, over which recesses prongs fastened to the keelson project, and under the prongs the stretchers pass. The upper ends of the stretchers are passed in between the canvas and the inner strip of the gunwale, which extends below the outer strip and keeps the gunwales raised and separated. The stretchers are made of wood or steel. On the inner surfaces of the stretchers blocks are secured from which upwardly projecting pins pass into holes in transverse boards serving as stiffeners for the ribs and supports for the seat. False bottom planks rest on each side of the keelson, and are kept in place by buttons. The boat can be folded very compactly, so as to be easily transported, and can be rapidly erected, while the plan permits a light and yet strong construction.

Oxalic Acid in Bleaching.

The march of improvement, in the processes of bleaching vegetable fiber, has hardly kept pace with that of dyeing. Indications that it will do so ere long are not wanting, but as yet we go on in the old way. We get rid of the impurities, natural and otherwise, by prolonged boiling in soda lye. We follow this with our bleach proper, consisting of solutions of chlorinated lime (chloride of lime), at first concentrated, then weaker and weaker. We alternate these with the souring, sometimes with sulphuric acid, sometimes with hydrochloric, and with baths of soda lye. The acids set free the chlorine of the solution of chlorinated lime, which saturates the fibers, and combines with the lime, while the lye serves to neutralize the otherwise destructive action of the acid. During these operations the tissues are washed many times with the largest possible quantity of water. Improvements in these operations cannot come too soon. At present they are costly and inconvenient. The water must be heated. The capital required for the first installation is considerable, and even with the best tools and appliances the time taken up, and the amount of hand labor required, are also great.

In order to lessen the inconveniences, says the *Moniteur des Fils et Tissus*, Mr. C. Beyrich, of Arnsdorf, Silesia, has proposed a process based on the three following points: 1. That oxalic acid, either free or as the oxalate of potassa, possesses the property of combining with the lime of the chlorinated lime more energetically than either or both of the acids commonly used in bleaching. 2. That the oxalic acid never attacks the fiber as do the other acids. 3. That the presence of vegetable substances, which, under the common system, are removed before the bleaching proper, does not interfere with the action of oxalic acid.

Of the three substances which compose chlorinated lime, but one, hypochlorite of lime, may be said to be of practical value in bleaching. Instantly deprived of its lime in presence of oxalic acid, the hypochlorous acid is set free, and almost immediately decomposed; its two constituents, chlorine and oxygen, being in the nascent state, act with redoubled energy; the oxygen directly on the coloring matter, the chlorine indirectly through the decomposition of water.

The cloth to be bleached is soaked at a temperature of from 20° to 26° C. for five or six hours in a bath of chlorinated lime, to which oxalic acid has been added. All of the oxalic acid is not introduced at once, the greater part being thus used, and the remainder in an hour or two. After bleaching, the goods are carefully rinsed and passed through a weak solution of sulphuric acid, then through one of sodic carbonate to neutralize the acid, and finally rinsed and dried.

The objections to the process, on the score of the expense of the oxalic acid, would probably not hold were a demand created for the acid The materials of which it is made are comparatively cheap, the methods of manufacture simple, and, stimulated by the demand, active competition would reduce cost. It must not, however, be forgotten that the oxalate of lime formed on the fabric is one of the most insoluble salts known. For scouring, many bleachers prefer hydrochloric acid to sulphuric, because the resulting salt is so readily washed out. They would find the oxalate of lime more objectionable than the sulphate, because of its greater insolubility. The invention is a move in the right direction, and as such it is deserving of a fair trial both with and without the modifications which will readily suggest themselves to experienced hands.

A Learned Woman.

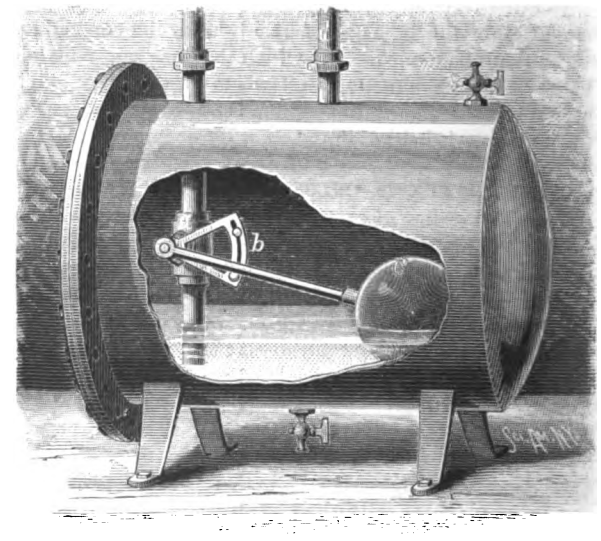
The life of Miss Anna Sutton, recently published in England, presents a character which it is more easy to admire than to imitate. She was born in the province of Ulster, Ireland, in 1791, and died in 1881. At 20 years of age, having previously received only a rudimental education, she found a Latin grammar, and forthwith attempted to master it. She learned the language, and read all the chief classics. Next she took up Greek and read the New Testament, Homer and such other Greek works as fell in her way. French, Italian, Hebrew, Arabic, and Chaldaic followed, and when past 80 years of age she astonished a learned descendant of Abraham by conversing with him in Hebrew. After the age of 70 she lost her eyesight and learned to read the books for the blind printed in raised letters. She was a devoted member of the Methodist communion and a "class leader" till within a year of her death. She, of course, must have had an extraordinary aptitude for languages. Still, her example shows how much more than is supposed the average mind is capable of doing, in any direction to which the taste may lead.

Flying Money.

While riding on top of a freight car in Chicago last Saturday, going toward the fair grounds, C. W. Leffler noticed a piece of paper flying toward him over the tops of the cars. The train was running at the rate of five or six miles an hour, and the bit of paper when first seen was distant some four or five car lengths. It came directly toward him, and kept on coming until it struck him near his vest watch pocket. He grabbed it, held on to it, scanned it, and ascertained that it was a genuine one dollar bill. Where it came from, or how it got started, will remain a mystery. It is not every day that money is obtained in that way.—*Aurora (Ill.) Beacon.*

STEAM TRAP.

The steam trap herewith illustrated was recently patented by Mr. James A. Trane, of La Crosse, Wis. The trap case is made, preferably, of cast metal, has one removable head, and is furnished with legs for standing on the floor. In the case is fitted an inlet pipe and a waste pipe, for the water, the latter pipe extending nearly to the bottom of the case, and being provided with a valve which has for its



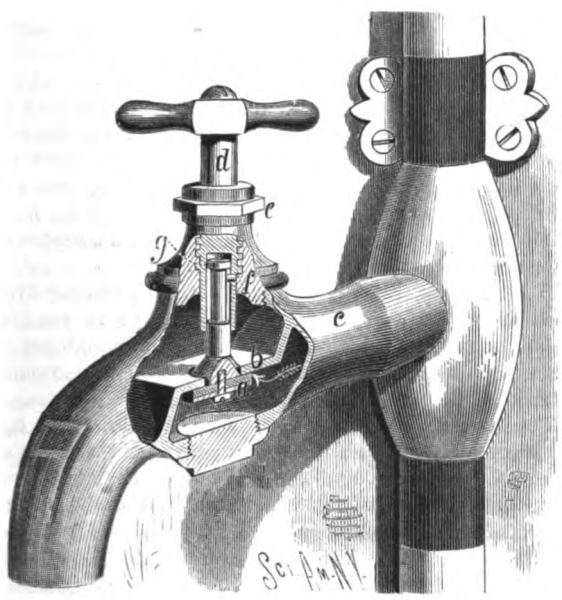
TRANE'S STEAM TRAP.

stem a triangular plate, *b*, having a curved slot in which two stop pins are adjustably fitted. On the center of the valve stem is one end of a lever, to the other end of which is a float, *c*, and which plays between the two stop pins. The lower pin is so adjusted that the float will close the valve when it descends by the fall of water, and shut off the escape through the pipe, just before the water falls below the end of the pipe. The other pin is to be set according to the height it is desired that the water shall rise before opening the pipe. On the top of the case is an air cock, *e*, and at the bottom a waste cock to draw off the water in cold weather when the trap is not in use.

By this arrangement the water cannot in any case be forced out so that the steam will blow through.

COMPRESSION COCK.

In the compression cock herewith illustrated, the valve, *a*, is closed up under the partition, *b*, by the pressure of the water under it, and falls and vents the pipe, *c*, so that the water will drain out whenever the supply is shut off in the mains, and automatically closes the passage when the water is turned on. The valve has a stem extending up through a socket in the lower end of the handle stem, *d*, that screws down in the cap to open the valve against the pressure of the water, by the upper end of the valve stem coming in contact with the bottom of the socket. The valve stem



BARR'S COMPRESSION COCK.

has a recess turned in it below the upper end for connecting it to the stem, *d*, by a set screw, *f*, which is so placed that it will limit the fall of the valve by the collar, *g*, which will lodge on it and thus prevent the valve from falling so low that it will fail to close by the pressure of the water. The stem, *d*, is packed by a cap, *e*.

This invention has been patented by Mr. James S. Barr, of Wheeling, W. Va.

The Old Locomotive "Arabian,"

After nearly fifty years of faithful service, was at last destroyed in the burning of the Pittsburgh Exposition building. The "Arabian" was not the first locomotive, but it was among the first, which did practical service in hauling trains on a railroad, and the excellence of its construction is attested by the fact that it was still at work after so many years of rough service. One or two older engines survived, but they were laid up and carefully preserved as curiosities, while the "Arabian" could claim without contradiction that it had been steadily at work longer than any other locomotive inthe world, and could be considered as the stillactive grandfather of the numerous family of its kind now running in this country. It was exhibited in Chicago, and on its return the Baltimore and Ohio Company allowed it to remain in Pittsburgh during the local exhibition there.

Microscopic Organisms in Building Materials.

An article in the San Francisco *Chronicle* by W. W. Goodrich, is as follows: "Having occasion to examine a brick that was taken from an old ruined and forsaken building, which was being torn down, I was somewhat startled, upon adjusting a microscope upon a fragment, to see each pore of the brick inhabited by a peculiar rod-like animalcule of the genus *bacilli*. These insects cannot be seen except by aid of the microscope, even when they live in the human system and prey upon our vitality; neither are they visible in the soil or substances in which they may live and hive, except through a powerful glass.

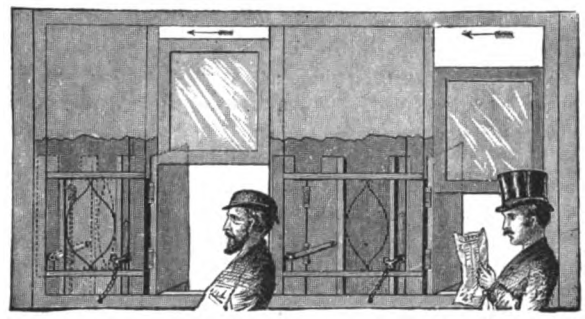
"Their motions when they were agitated by blows were as the links of a chain, reminding one of a system of joints to be extended and contracted. They were semi-transparent, with a light, scintillating column nearly two-thirds their length, extending from near their head to their pointed tails, probably their spinal column. As this brick was from the foundation, and being underground and next to the street sidewalk, it illustrates forcibly the fact that, however hard burned and well made, porous substances should not be put underground for foundations or sewers. Solid rock or concrete or terra cotta are the only proper building materials below the level of the sidewalks.

"If we wish a healthful city we must have healthful homes, healthful business houses, and healthful apartments. It has been said that the fetid breath of any person disseminates the floating germs of the disease that caused that foul breath, and if so of a person, the same will be true of any porous building material where the dampness of any soil or subsoil has sufficient moisture to generate the germs, and there is putrescent matter floating and dropping about continually to keep the germs in active principle. Buildings should have stone foundations where exposed to any possible seepage from any drainage or from sewers."

Writing to the *American Architect*, he adds: "I have repeatedly examined porous building materials, and in all cases where subject to human or animal evacuations I have found the organisms mentioned. The *bacilli* are the same that I have seen from human kidneys affected by Bright's disease, and more especially after persons had died, and where uric acid had been very prominent. In one case of Addison's disease an examination indicated the same animalcules. I have a fondness for the curious, and mere accident caused me to examine a brick, and following up the clew thus obtained I have discovered the same conditions of life to exist in several instances."

DUST AND CINDER DEFLECTOR.

The accompany engraving represents an automatic dust and cinder deflector, applied to the windows of a car, which prevents those annoying particles from entering the car and at the same time keeps up a circulation of air. A steel elliptical spring, 14 inches long, has a bar of wood the same length attached to the center and outside of one leaf. To the outside of this bar is attached a strip having a width sufficient to reach just outside the window, and having a height equal to the raised window, and having a rebate cut in the outer edge of its top. To the outer edge of this strip the deflector is secured by coil spring hinges. The deflector has a height equal to that of the strip, projects 2½ inches beyond the body of the car, and is kept at an oblique angle by the springs and a stop block attached to the sill. In the top and bottom of the bar are grooves, so that the combination may slide forward and backward along horizontal bars placed across the space in the side of the car. The device is pressed outward by the elliptical spring. The deflector may be moved inward and retained at the angle required by the levers operated by a key from the inside of the car. The deflectors are arranged on both sides of the windows, so that one set may be used when the train moves in one direction and the other set for the contrary direction; when not in use the deflectors remain in the recesses provided for them. The device prevents cinders from entering the window and creates a draught which relieves the car of impure air. By a slight change in the device the windows may be held at any



MEARS' DUST AND CINDER DEFLECTOR.

height, thereby doing away with the common catch spring. Further information can be obtained from the inventor, Mr. H. B. Mears, Santa Cruz, Cal.

FOLDING TABLE.

The table is designed for use in cars, steamboats, houses, and other places where it is desirable to have a table that may be readily set up in position for use and as readily put away compactly. In the engraving the table is represented as in use and also (in the sectional drawing) when put away. The table top, *a*, has a hinged extension, *d*, on one side and a jointed brace, *b*, attached to the under side, and is fitted to slide endwise up and down in a vertical case. The end opposite the one having the jointed section may have a knob

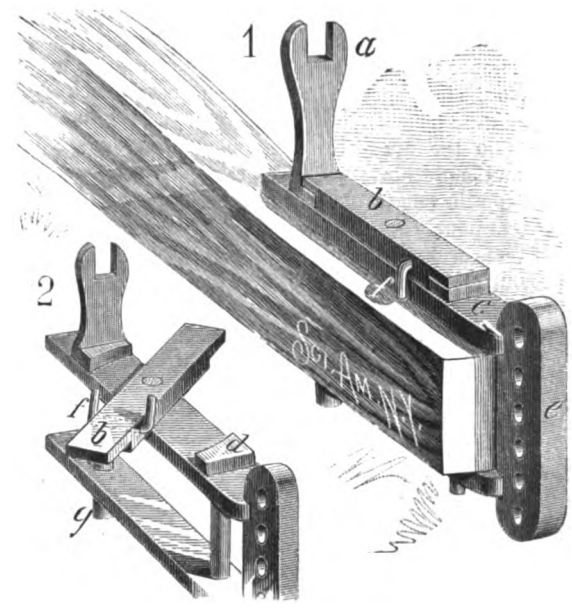
ABBOT'S FOLDING TABLE.

as *e*, or an ornamental moulding. To adjust the table for use the top is raised until the joint reaches the top of the case, when it is swung down to a level position, where it is supported by the brace whose end is placed in a rocket, *c*. Any suitable stops may be provided in connection with the jointed section to prevent it from being drawn out of the case. The under side of the top has a groove in which the brace sinks flush with the surface. To fit the table into a perfectly flat surface or into a wall, the top may be made without tongues to slide in grooves in the case, so that it may swing forward before rising out of the case. In this form a hook is employed to prevent the table from falling forward. The case may be constructed so as to be self-supporting on its own base for a portable arrangement of the table.

The invention has been patented by Charlotte E. Abbot, of Portland, Maine.

CLEVIS.

The main bar of the clevis is made in the usual form with upper and lower arms and a vertical front bar having a



ROUSE'S IMPROVED CLEVIS.

series of holes for adjustable connection of the draught. The clevis is connected to the beam of the plow by two pins, shown in Fig. 2, the rear pin being made the stronger and having its head elongated and recessed at the top (*a*, Fig. 1) to serve for a wrench which shall always be at hand when required. The pins have heads on which the tongues of the lock bar, *b*, overlap when the bar is swung on its pivot, by which it is swiveled to the upper clevis arm. The pins are thus held securely in place. The parts are held in position by a simple ∩-shaped latch, *f*, that is passed through the lock bar transversely, the arms of the latch passing on each side of the bar and clevis, thereby preventing the bar from turning off the heads of the pins. The joint shoulders of the lock bar and pin heads are made obliquely, as indicated in Fig. 2, so that the bar can swing only one way. This invention has been patented by Mr. R. A. Rouse, of Levee Township, Illinois.

The Largest of Apple Trees.

BY H. C. HOVEY.

In a wild state the apple tree seldom grows to great size, the largest specimen of the American crab apple that I have seen being but twenty feet high, and having a trunk but a foot in diameter. The average size of the cultivated tree, under favorable conditions, considerably exceeds this, and specimens are not rare with a spread of forty feet, and a trunk two or three feet through. Such are to be seen on the old farms of New England, relics of the days of hard cider and the best of vinegar. It has been discovered that these old orchards, whose fruit long ago ceased to be of marketable value, make excellent kindling wood; and it is a fact that many of the largest trees are thus disappearing in smoke.

While visiting such an orchard near New Haven not long ago, the farmer, perceiving me to be taking notes as to the dimensions of his trees, told me that probably the largest apple tree in the world was to be seen on the farm of Delos Hotchkiss, in Marion, Conn. I need not give the size as originally stated by my informant, and which was, like most such matters, much exaggerated; for I have just had exact measurements taken, as follows:

Circumference of the trunk, near the ground	15 ft. 3 in.
" " " three feet from ground	13 ft. 9 in.
" " " at the forks	16 ft. 2 in.
" " 2 main branches	10 ft. 4 in., and 8 ft. 8 in.
" of nine smaller branches, from	4 to 6 ft. each.
Height of tree	60 feet.
Diameter of tree top	104 feet.

A peculiarity of this tree is that it is what is termed "an alternate bearer;" five limbs bearing one year and four the next. The usual yield from the five limbs is about 85 bushels, although in a single instance it reached 110 bushels; and the four limbs vary from 35 to 40 bushels. The fruit is said to be excellent for winter use, though on this point I can only speak from hearsay.

The age of this venerable apple tree is estimated at about 175 to 180 years. Curiously enough the patriotic old tree marked the centennial year by bearing fruit on *all* its branches, the first time it was known to do so in its life, and it has continued to do so down to the present time. Some of the limbs are now dying, others are broken down; signs of decay appear in many places, and it is thought that this noble specimen of *Pyrus malus* will be numbered among the things of the past.

UNITED STATES SCREW STEAM CRUISER ATLANTA.

(*Continued from first page.*)

The drainage has been closely attended to, and the total pumping power of the steam and circular pumps, with capacity of 2,500 tons per hour, can be concentrated on any main compartment. In addition there will be six continuous acting hand pumps on the berth deck, which will have independent suctions to each main compartment and each compartment of the double bottom; they can be used for flooding any compartment or flushing the drain pipes, and will deliver into the fire main or directly overboard as may be required.

The machinery spaces, for 100 feet, will be protected by a steel deck, 1½ inches thick, and this deck will be so placed with reference to the water as to afford the maximum protection to the buoyancy. The deck is to be stiffened at the sides by transverse frames in the lower coal bunkers, the brackets in the upper, the fore, and aft coal bunker bulkheads, and amidships by deep I-beams. An inner bottom will extend the length of the machinery spaces, forming a watertight double bottom containing twelve watertight cells. All of these cruisers will be fitted up with bilge keels.

The outside plating will be 23 pounds per square foot, with a double plate at the water line from the stem to near the stern. The fixed ammunition and shell rooms and the magazines are to be in the hold amidships, directly before and abaft the machinery space.

The motive power will be obtained from a three cylinder, compound, horizontal, back acting engine of 3,500 indicated horse power. The engine will have one high pressure cylinder 54 inches in diameter, and two low pressure 74 inches in diameter; the stroke being 42 inches. The cylinders will be located with their axes parallel, 9½ feet apart, on the starboard side of the vessel. The crank shaft will be made in three interchangeable sections secured to the line shafting and to each other by couplings forged on the shafts. The low pressure cylinder cranks will be set at right angles, and the crank of the high pressure cylinder will be set between the others at angles of 135 degrees. The shaft will be steel 16 inches in diameter at the main journals.

The screw will be 17 feet in diameter with a mean pitch of 20 feet, will have four adjustable blades, and will be made of steel.

Steam will be furnished by eight horizontal return tubular steel boilers placed forward of the engine and divided into two sets by a watertight bulkhead athwartship. Each boiler will be 9¾ feet long, 11½ feet in external diameter, and will have two cylindrical furnaces 43 inches in internal diameter, made of corrugated steel.

The disposition of the battery is thus described by Assistant Naval Constructor F. T. Bowles, U. S. N., Secretary to the Naval Advisory Board, in a paper presented to the United States Naval Institute, and from which the above items were condensed: "Outside the forward port angle, and the after starboard angle of the superstructure, an 8 inch long rifled gun will be mounted in a barbette about 8 feet high, built of 2 inch steel plates. The forward gun has a train from 40 degrees abaft the beam on the port side, sweeping the whole deck forward to 30 degrees abaft the beam on the starboard side; similarly for the after gun. Within the superstructure six 6-inch B. L. R.'s will be mounted; two, on each broadside, with a train of 60 degrees before and abaft the beam; one, forward in the starboard angle of the superstructure, may fight either through a forward or a broadside port, giving a total train of from 20 degrees across the bow to 60 degrees abaft the beam. The remaining gun is similarly mounted on the port side aft."

Fall of the Wisconsin Capitol.

The disastrous effect of pushing work on masonry so rapidly that the mortar has not time to set before being subjected to an excessive load, was most painfully illustrated at Madison, Wis., on the 8th inst. Work on the second story of the balcony of the south wing of the new capitol building was being hurried, in order that the building might be closed in before cold weather came. The "green" mortar had not acquired strength enough to withstand the pressure, and as a natural sequence the wing fell with a crash, killing four men outright and more or less seriously injuring nineteen others. Although mortar takes a long time to attain its full strength, it becomes, in a comparatively short period, strong enough to bear a heavy steady pressure; and when we consider that this fact is well known to builders, the custom of rushing up a structure cannot be too emphatically denounced. Because this plan is being pursued every day with impunity is no excuse; the practice is dangerous.

The Greek Sponge Fisheries.

The Greek sponge fisheries have been very much developed within the last two years, and at the present time there are 723 boats, 183 of which are provided with diving bells, employed in this business. These boats, which carry from five to seven men, nearly all belong to the ports of Hydra, Egina, Cranidi, Hermione, and Trikeri. The fishing season commences in April and ends in August, the boats which are provided with diving bells going as far to sea as Tunis and Tripoli, while the others do not go beyond the coast of Greece and Crete. The value of the sponges taken during the past season is put at £96,000, nearly half of which is credited to the Hydra boats, while those from Egina took about £27,000 worth of the remainder.

Work and Hurry.

Mr. Herbert Spencer thought that the most valuable piece of advice he could leave us in departing from our shores was to be less restless—to work less and play more. Overwork was the besetting sin of Americans, according to that English philosopher, who spoke with the more feeling and the stronger emphasis on the subject because he himself was a victim of the very excess against which he warned us. He had come to the United States, in truth, with the hope of restoring tone to his nervous system, so shattered by indiscreet application to study that he was unable to sleep soundly.

Sensible people here, however, knew very well that working too hard was not an American vice. It is rare to find an American whose tendency to sin takes that direction. The men who complain most of overwork are usually those who are unfitting themselves for exertion by bad habits of self-indulgence. They could do their work without undue strain if they did not otherwise overtax their nerves.

But there is another very frequent cause of nervous prostration. It is hasty and unmethodical labor, the habit of hurrying. But that cause, it seems, is commonly active in London no less than in New York.

The London *Lancet* warns the "city men," that is, the business men, that they are wearing themselves out with unnecessary hurry and bustle. It also tells physicians that they would do far more to prevent the spread of nervous disease if they undertook to cure this vicious mental habit, than they can hope to do by dealing only with the particular ills which come from it.

One of the chief characteristics of business life, the *Lancet* says, is to be always in a hurry. The moment a lad enters a business house "he begins to make believe to others, and too quickly to himself, that he is overwhelmed with work. The result is the formation of a 'mental habit' of hurrying, which before long becomes the keynote and motive of the whole life. It is the custom to write and speak as though commercial men were really as much pressed for time as they pretend to be. Now, the simple fact is that all their haste and turmoil, prejudicial and often ruinous as it is, is artificial."

The bustling, hurrying man, as a matter of fact, is a poor worker, and accomplishes comparatively little in a day. Too much of his steam power is expended in kicking up a dust. The habit of hurrying and of feeling in a hurry is fatal to good work, and diminishes the amount of work a man can get through with. The friction is too great. So little of practical value is accomplished, despite all the superfluous expenditure of energy, that he cannot go home at night with the sweet consciousness of duty done, of a day's work completed. He has left too many stitches to be taken up.

The men who accomplish the most never seem in a hurry, no matter how much they have to do. Everybody must have observed that. They are not troubled for lack of time, for they make the most of the minutes by working in a cool, clear, orderly, and methodical fashion, finishing each job properly, and not wasting their nervous force on trifles or expending it in bustle. They never complain of overwork. They are more likely to be hunting up new work to do, in order to give their faculties more varied employment and to exercise some which are not sufficiently used.

Too much work to do! The highest pleasure and greatest satisfaction are found in work only, and the more work a man has to do, if it is work to which he is adapted, the better he likes it. The men to pity are those who can get nothing to do, and those whose only business is to hunt for pleasure for itself—the fellows who have no other occupation than that of killing time. But we are also sorry for the men, whose manner, as described by the *Lancet*, suggests a boiler worked up to the highest pressure and only saved from bursting by frequent letting off of steam.—*N. Y. Sun.*

Underground Telegraphy.

A successful trial of a new system of underground telegraphy was lately made in Philadelphia, according to the *Press* of that city. The system is that controlled by the Brooks Underground Conduit Company, of Delaware, which has now in operation a subterranean pipe containing thirty-three wires from Third and Chestnut Streets to the depot of the Pennsylvania Railroad Company at Kensington, a distance of two and a half miles. The cable is laid eighteen inches underground, and the old difficulty heretofore experienced in running telegraph and telephone wires in the same duct is obviated. The Western Union has ten of its New York wires in the pipe to Kensington, which are being used for transaction of ordinary business. The conductors are immersed in paraffine oil to keep out dampness. The outer covering consists of lead. It is claimed that electric light wires can be carried by this system, and the cost of introducing them into houses will not exceed that of putting telegraph and telephone wires into buildings.

Yellow Ocher.

At Bermuda, Va., on the Appomattox River, about one thousand tons of yellow ocher are annually taken, at least one-third of all the fine ochers used in the United States, a large portion of our supply coming from France. The Virginia deposit contains about ten per cent of sand or grit, which must be washed out before the ocher can be ground and bolted, but the French ochers are so pure as not to require washing.

Final Effects of Bacteria.

After a couple of years of cultivation and growth of bacteria, using about one hundred homœopathic vials, with various animal and vegetable infusions as commonly made, it appears that in all cases the material wrought upon is never left alone till it is fully decomposed as an organic substance and resolved back into its simple constituents.

Although many kinds of bacteria in many cases assisted each other in the work of disorganization, yet the main work was done by the *B. termo*, which greatly outnumbered, overpowered, and destroyed all before it, including other dead, unencysted bacteria, or even its own dead.

Could an average proportion of bacteria, bacilli, micrococci, and spirilli be made, it would stand about as 90 : 10 : 10 : 5; yet these varied very greatly in vegetable infusions, some forms appearing only transiently, and of the first named ninety-nine hundredths were *B. termo*. Some infusions were longer in being changed, as circumstances were more or less favorable; but in all cases, when the work of decomposition was fully finished, only an impalpable gray powder or sediment remained, with a beautifully clear and apparently pure liquid above.

How this beautifully clear liquid could be obtained from such a putrid mass is a mystery, and, strange to say, both sediment and liquid were free from smell, although some of the vials had been kept tightly corked, except to be examined occasionally.

This fragmentary experiment goes to show that these organisms properly hold their sphere between the living and the dead, to prepare new material out of the old for the immediate demands of new and subsequent organic life.—*J. M. Adams, in the Microscope.*

Proposed Employment for our Naval Engineers.

In the annual report of the Bureau of Steam Engineering, the principal facts of which have just been published, it is recommended "that assistant engineer officers be more generally utilized in navy yards as heads of the several shops for which their profession fits them. The expense for salaries for master workmen or foremen would thus be saved in many instances." This recommendation, however, seems hardly consistent with a paragraph further along in the report, which reads as follows:

"The difficulty of securing engineer officers for each ship in service has already made itself seriously felt. With the number of assistant engineers fixed by the act approved August 5, 1882, it is impossible to properly officer our ships in the Engineering Department. To intrust the watches to the young naval cadets, except they may have had special training therefor, or to the present finishers, is but to invite disaster, and the occurrence of some great calamity can only be a question of time. If the lives of the officers and men of the Navy are of less consequence, or if the care of the machinery of our vessels of war is of small importance, then such a system needs no criticism."

We should think that if it was already difficult to obtain good engineers for necessary duties on shipboard, it would hardly be policy to try and "utilize" any of the present available officers by making them heads of machine shops on land. The report adds that the various shops under the control of the Bureau are in good working order, and calls attention to the superiority of mild steel to iron in boiler construction.

Look out for Leaks in Ammonia Ice Machine Pipes.

The cellars of a Cincinnati brewery are cooled by ammonia gas, carried through them in pipes. A leak recently occurred just outside the cellars, and the gas was set free under the stables, forming, in the moist atmosphere, hydrated ammonia, intensely corrosive to animal tissues. In a few seconds this began to act upon the lungs and eyes of the horses, and 66 of them were soon dead or dying. Even some street car horses passing were said to be so powerfully affected that they fell to their knees, and were with difficulty roused to drag a car and its passengers out of danger. One man, standing near the stable door, was seen to fall, but was rescued by those who had noticed it from a distance. This singular accident should impress upon those who have the management of ice machines the necessity for great care and watchfulness, that we may not some day have an accident in this line as serious as the blowing up of a steam boiler can sometimes be.

Propagation of Carp.

The water was recently drawn off from a carp pond at Washington, located between the White House and the Potomac River, used by the Fish Commission for propagating purposes. This pond covered about five acres, the water being shallow, as carp do not require great depth. When the water was reduced to a narrow stream crossing the pond, the fish were scooped out with nets, transferred to tubs, and having been carefully counted, were ready for shipment to such points as Prof. Spencer F. Baird, the Commissioner of Fish and Fisheries, had directed. The increase had been 65,000 in one year. The fish taken were varied in size from the minute specimens half an inch or less in length to those of two or three pounds in weight. They were principally mirror carp, having a few scales along the back, but there were in their company not a few leather carp and an occasional hybrid and tench.

Correspondence.

Apprentices not Wanted, and Poor Journeymen Numerous because Machinery does so Much.

To the Editor of the Scientific American:

Dr. Walker's plan for directing the Boston boys toward industrial occupations, as noted in your issue of November 3, is, no doubt, practicable so far as regards some manufactures. But how about the facts as touching carpenters' apprentices? In times within my memory every carpenter shop held at least one apprentice, some of them half a dozen or more. Then the apprentice boy commenced at the very bottom of the business and learned it from there up. The first thing to learn was to hold the chalk line, next to rip out furring strips, then to plane boards. After a little practice in such rudimentary occupations he was taught to plane up and joint panel stuff, next to make, perhaps, a window shutter or a door, and so on up until "out of his time," so that when he commenced as a journeyman he was a pretty good mechanic—say a hundred per cent better than the average journeyman of the present day.

The principal cause of the present changed conditions is to be found in the large use of improved woodworking machines. The occupation of the apprentice boy of former days is gone. He has no chalk line to hold, no furring strips to rip, no boards to plane, no shutter or door to make. Machinery now planes the boards, saws the strips, rabbets the jambs, "sticks" all the mouldings and casings, stop beads, shelf cleats, etc., and planes all the bases, makes all the panel work, wooden mantels, window frames, and drawers. Much of the trimming of a house nowadays is even fitted together and glued up in the mill, so that about all the carpenter has to do is to put it in place, while he has only a small part to cut and fit together. It is not strange, therefore, that the "trade," as now professed by many workmen, is mostly "picked up."

Such tools as these "journeymen" have, too! If you could only see some of them, you would just turn round and *cough*. And what is true of the carpenter business is also true of plumbing, tinning, painting, etc., and to the same causes must be mainly attributed the "choking up of the paths of life leading to fame and fortune," as described by Dr. Walker.

Brooklyn, November 2, 1883. SAMUEL R. GOODSELL.

Storage of Power.

To the Editor of the Scientific American:

We notice considerable attention is lately given by the inventing public to furnishing a cheap and effectual method for storing power, to be subsequently used as desired. It seems that we must look to the electrician to supply this want, and we confidently expect, if we live long enough, to see a customer walk into a retail hardware store and buy 10 H. P. for one hour, which he shall carry home in his hand as would a commercial traveler his "grip." That some accumulator of electricity can be made thus much powerful and portable seems to us to be a destined fact, and the man with the pluck, luck, and brains to do this is already born. The ingenious individual who proposed to set a water wheel at Niagara and run a line shaft to Boston and New York, renting power along the line, would be commonplace beside the man who, using Niagara or other power, should so bottle up energy that it could be transported anywhere, regardless of a line shaft, and used for any of the thousand purposes for which power is used. Think of sending to market for a package of H. P. to run our electric light this evening or to run our sewing machine or to rock the baby! Further, it may not be convenient to always send to market. Suppose we have a good windmill, of which several good ones are built besides the Champion self-governing mill, which we make.

A small mill of this kind will produce an effective power of one horse, in a fair wind, equal to 24 H. P. for one hour of the day, provided the wind continues to blow. As the latter is uncertain, suppose we say it can in 24 hours store 10 H. P. for one hour, the power to be used as needed at any time.

Electric lights could be almost as common as kerosene lamps, much more common than gas now is outside of cities. It might seem that this power could be stored by means of raising weights, winding springs, raising water into reservoirs, or compressing air; but so far nothing has met the requirements of cheapness of plant and economy of using the power thus stored.

To lift 33,000 pounds one foot in one minute, and so continue for 24 hours, would require a tower capable of sustaining this weight 1,440 feet high; twice the weight, half the elevation, and like proportion, an estimate of the cost of which is fatal to its practicability. Springs have similar objections. Raising water requires, first, that you have the water; next, that you have the elevated reservoir into which to raise it; and then you have the wastage of leakage and evaporation. To store compressed air requires an expensive plant, and is attended with great wastage of power.

Now, Mr. Editor, we are driven to expect that the electrician is to help us out of this dilemma, and we trust in you to stimulate the experts in this science, so that before we leave this sphere we shall see marketable H. P. as common as soap boxes are now; and when we move on, that the undertaker shall send out and buy the motive power to move the procession, and let the horses rest.

Waukegan, Ill. POWELL & DOUGLAS.

The Ice Industry.

In an article in the *Franklin Journal*, Prof. W. P. Blake says the cost of cutting ice and packing it away in the ice house varies greatly, according to the varying conditions and the perfection of the arrangements and the skillful use of all the appliances. With an unlimited supply of good ice, say 10 to 12 inches thick, the cost may be as low as 12 cents per ton. At an ice house where some 10,000 tons were harvested during the past winter, the cost was estimated at 15 cents per ton. The average cost is nearer 25 cents.

When the crop is abundant, it is not unusual for the owners of the plant for filling large ice houses, after the houses are filled, to continue cutting for the benefit of persons who wish to fill private ice houses. This is practiced near some of the populous cities and villages within carting distance from the lake or river. Ice, the past winter, was sold in this manner at Lake Whitney, two miles from New Haven, at 40 cents per ton on the platform by the road side ready to load into wagons. The cost of carting to the city was from 50 cents to 60 cents per ton, being more than the cutting and raising the ice to the platform.

But the first cost of the ice, as stored away in the ice houses, is not a just basis of an estimate of its final cost to the ice dealer when it leaves his hands and passes into those of the consumer.

The loss in weight of ice by melting, evaporation, and breakage is very great, and is an important item in the business, for although ice may be gathered and housed at an apparently trifling cost, only a fractional part of the quantity harvested is utilized. One dealer who puts up some 10,000 tons yearly, estimates the wastage at 25 per cent by melting in the houses during the season, 25 per cent in taking out and carting, and of the remaining one-half there is often a loss of 33 per cent in retail vending, or a total wastage of four-sixths of the entire amount stored. This is probably a large estimate. Others place the loss by melting from the close of winter to the end of the season at 25 per cent, and an additional loss of 25 per cent to 30 per cent in carting and delivering to consumers.

It is estimated that the consumption of ice in the city of New York is upward of 700,000 tons annually, with an annual increase of 15 per cent. There are fifteen or more ice companies, besides small dealers who buy of the large companies. The manufacture of artificial ice does not appear to affect the demand for the naturally formed article.

The Upper Hudson is a great source of ice for the New York market. Those who travel between New York and Albany, either by boat or by rail, cannot fail to notice the many large ice houses which crowd the banks in some places from Troy and Albany as far down as Rhinebeck, Rondout, and Kingston. The river not only yields the product, but in summer gives it cheap transportation.

The conditions for the ice industry are thus exceptionably favorable. Full statistics for the present year* show that there are nearly two hundred ice houses along the river, with a storage capacity of from 500 tons to 60,000 tons each. The total amount harvested this year is not less than 3,000,000 tons—one of the largest harvests of ice ever gathered along the river. The ice crop for the past six winters has been as follows:

Year.	Harvested tons.
1878	2,408,500
1879	2,061,500
1880	150,000
1881	2,500,000
1882	3,000,000
1883	3,000,000

The Leopard Frog.

The leopard frog (*Rana halecina*) is the most common species of our five American genera. If there is any beauty to be seen in the lowly members of this order, he might also be called the handsomest of the species. His color varies from light to dark green, or brown above and white or yellow beneath. There are two dorsal and two lateral rows of dark oblong spots extending longitudinally the length of his body; the lateral rows continuing along the thighs and legs. These spots are often margined with yellow. The tympanum is green; the nostrils are lateral, and about midway between the eyes and muzzle. His length, including legs, is eight or nine inches.

The leopard frog is a great leaper. I was once sitting in the woods at some distance from a little mountain stream when I was startled by a shrill peeping cry, rapidly repeated, and surprised to see one of these frogs leap by me, covering fully ten feet at every jump. It was pursued for a short distance from the stream by a large water snake which was the cause of its fright.

This frog inhabits wet places in marshes, the borders of streams, and woody pools. Often in the summer evenings, and especially during wet weather, they wander long distances in search of their prey, and may be found in the meadows far from the water. It is widely distributed throughout the United States, and if we include, with many authorities, the marsh frog (*R. palustris*), as a variety, it has representatives in all the Southern and Eastern States. This species is the analogue and nearest representative here of the European green frog, being like that sought after for food. The meat is delicate and very nutritious, and the establishment of "froggeries" in various parts of the country will in time make it a popular dish.

In our Northern States frogs grow very fat during the fall and spend the winter in a dormant state. The length of their hibernation seems to depend entirely upon the severity of the season, and in captivity, if kept in a warm place, they show no desire to hide themselves or undertake their long sleep.

About a year ago the writer captured a leopard frog in a meadow. It had not lost the direction of the water, for, on being pursued, it took long leaps toward the brook, which it could not see. It was brought home and a place prepared for it in a fern case. A vessel of water surrounded by moss and stones and growing ferns was covered by a large glass case. In this prison the frog passed the entire winter. He had for company two red salamanders and a younger brother of his own kind. The latter disappeared during the first day, eaten by the larger amphibian, and after him went every creeping and flying thing whose size would permit it to be swallowed, except the salamanders. It was amusing to see Rana undertake a meal of salamander meat. He tried it several times before he learned better. His little victim would almost disappear from view down the capacious gullet, but the pungent liquid thrown out from all parts of the body seemed too much for the frog's palate, and it was invariably ejected. After this trial of strength the three prisoners became great friends, and the salamanders would often crawl over the frog, he winking at their familiarity and rarely paying any attention to them.

If the case were allowed to become cold, Rana would dig out a cavity in the moss where he would sit buried up to his eyes, always, however, spending the greater part of the night in the water. During nearly two months nothing was given to him to eat, and when spring brought back the insects his voraciousness knew no bounds. Flies, grasshoppers, bugs and bees, all were given to him and all devoured. Large beetles, such as the June bug, were tried, but their tough coats protected them. Though taken into the mouth they were finally thrown out. It was very amusing to watch him capture a wasp or bee. Instinct or experience had taught him to dread the sting, I suppose, as his method with them differed from other insects. He would first crush them between his jaws and then swallow them; sometimes he would drop them from his mouth and take them up again, as if seeking a better hold. Frogs will attack nothing unless it is alive or moving. A piece of meat drawn by a string was enough to attract my prisoner, but one of those curious insects, the walking stick, escaped his attention for a long time. It was amusing to see the frog jump at flies which were on the outside of the glass case. He would even spring at the point of a lead pencil if slowly moved over the glass.

In the early spring a large grasshopper fully as long as my frog was put into the case, and immediately seized. Then followed one of the most curious and laughable scenes imaginable. About half of the insect's body was easily swallowed; the other end was then placed against a stone, and the frog gave a succession of little leaps, thus pushing himself over the remainder. One leg of his victim refused to go down, and after protruding from the corner of his mouth for a day and night, was finally brushed away with his hind foot.

My animals and plants lived well together under the air tight glass case through the entire winter, mutually benefiting each other, I have no doubt, just as water plants and fish preserve the purity of an aquarium. I recommend the plan to those who desire an opportunity of studying this class of animal life, and learning much of their habits and peculiarities.

W. W. THOBURN.

Decisions Relating to Patents.

The Commissioner of Patents holds that although a party may be first to conceive and embody an invention in practical form, where it appears that his invention was laid aside, lost sight of, forgotten, and abandoned, and other means adopted for securing the same result, he forfeits his right in favor of a subsequent and independent inventor. His original efforts must be regarded as an abandoned experiment, and cannot be revived after the subsequent invention of the same device by another.

On an appeal from the Primary Examiner the Commissioner has decided that two independent inventions cannot lawfully be included in one application for a patent. The law contemplates that a patent shall be granted for each distinct and independent invention, not for a multiplicity of inventions. In a case where there can be no question that there are two independent inventions embraced in the application within the meaning of the patent law, to grant a patent covering both would be a violation of duty on the part of the officer granting the patent and a violation of the law when it was granted. It is possible that the court would sustain the patent if granted, if there was any doubt as to whether the matter covered by the patent was a single invention; but if it was clear that two distinct inventions were embraced in the patent, not dependent upon each other, I have no doubt that the court would hold such a patent invalid, and the patentee remediless thereunder. With such view of the law but one course can be taken. Applicant must divide his application as required by the Examiner, and if he desires to cover both inventions by patents, embrace them in separate applications.

IN boring an artesian well in Monroe County, Miss., a petrified log was struck at a depth of 214 feet.

* Published by the Albany *Evening Journal*, January, 1883.

IMPROVED COMBINED SHEARS AND PUNCH.

The machine tool shown in the accompanying illustration is given to show the prevailing European style. It has been designed in view of quickly satisfying certain constantly occurring needs connected with work in large naval establishments, boiler manufactories, etc.

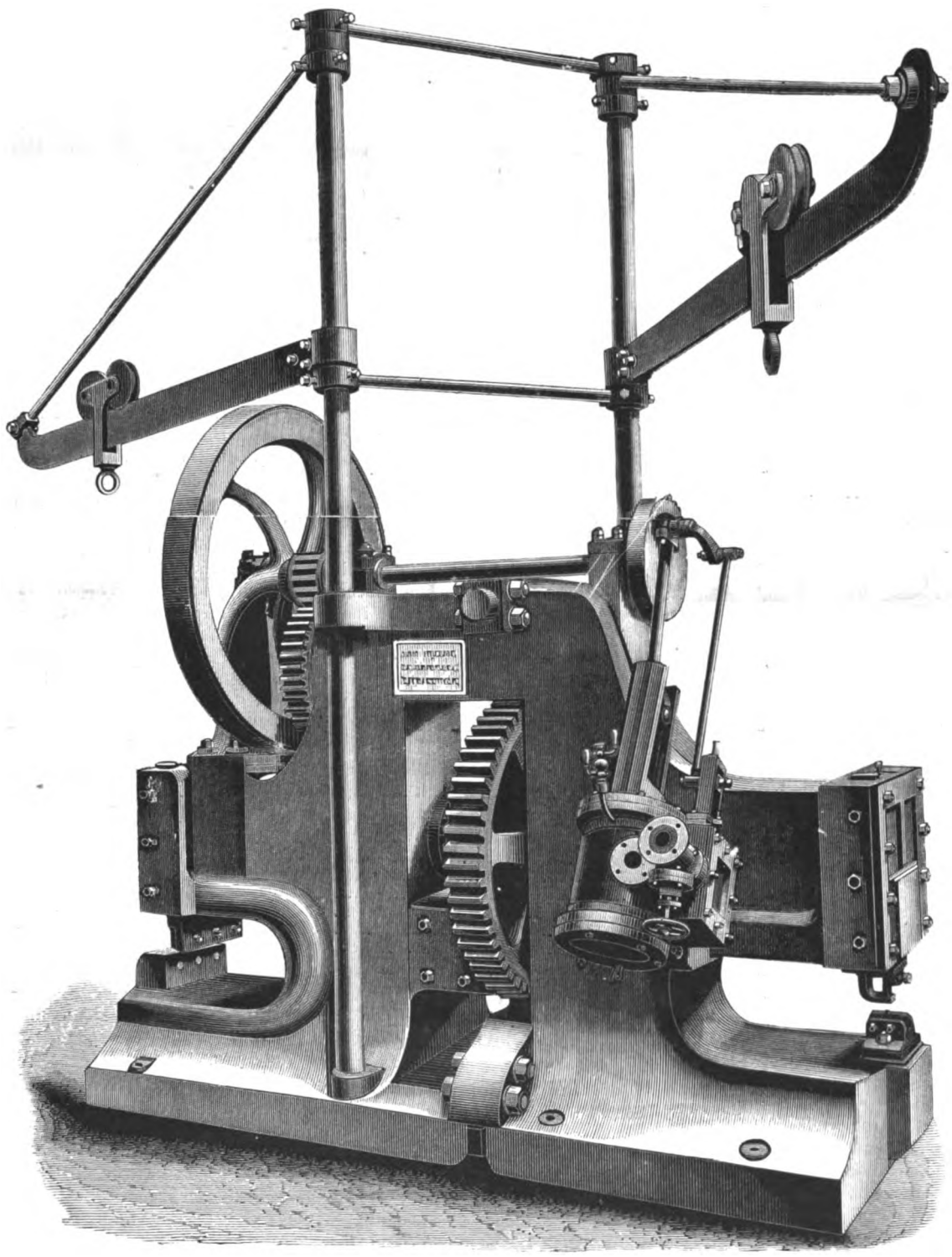
It consists of two solid frames connected together by means of eight large bolts and of wrought iron hoops put on while hot. These frames are hollow in the interior, and each elbowed extremity is strengthened by strong ribs.

A punch and shears are arranged symmetrically upon the machine and, besides these, shears for cutting angle irons are fixed longitudinally in the space between the frames. The motive power is furnished by an independent steam engine, which is fixed to one of the sides of the punch. The piston of this motor is 260 mm. in diameter, and its stroke is 400 mm. The connecting rod is pivoted to a crank plate which is supported by the driving shaft. This latter runs in three pillow blocks provided with bronze bearings, one of them being in front of the flywheel. The transmission of motion for actuating the tools is effected by means of doubles gearings, whose teeth have been moulded and cast with the greatest care. The last wheel sets in rotation a longitudinal shaft which carries three eccentrics for actuating the shears for cutting iron plate, those for cutting angle irons, and the punch, respectively. This shaft revolves in boxes lined with hardened cast iron. The tool carriers slide in large guides, which are adjusted with care, and which can be regulated by means of screws. Each of them is provided with an easily maneuvered starting gear. To the sides of the frames there are fixed upright columns, which are strongly cross braced and carry wrought iron cranes for holding and manipulating the pieces of iron to be cut or punched.

The opening in the shears frame (figured to the left in the cut) is 0·7 m. in depth, and permits of cutting in a longitudinal direction, and into two equal parts, sheets of iron as much as 1·4 meters in width. The blades are capable of cutting through metal 32 mm. in thickness.

The longitudinal distance of the axis of the punch from the frame is 0·65 meter. This tool is capable of punching holes 38 mm. in diameter through iron plate 32 mm. in thickness. Finally, the central shears are arranged for cutting through angle irons whose sides have, at a maximum, a width of 150 mm.

This machine has a total weight of nearly 17 tons. It has already received three applications in ship building establishments in Northern Germany, and is one of the largest multiple machine tools in use.—*Revue Industrielle.*



IMPROVED COMBINED SHEARS AND PUNCH.

An English Express Locomotive

A correspondent of the *Railroad Gazette* says: A passenger engine on the London and Northwestern Railway has recently run 151,000 miles in 15 months. This was chiefly composed of daily trips from Manchester to London and back, a distance of 375 miles. The engine has cylinders 17 inches by 24 inches, four wheels coupled 6 feet 6 inches diameter, and a pair of leading wheels which accommodate themselves to curves by means of a lateral motion, which is regulated by double inclined surfaces on the top of the axle boxes and through which the weight is transmitted from the springs. This gives a slight flexibility to the wheel base. The load taken was very regular, and consisted of about 100 tons for more than half the journey, and about 150 tons for the remainder. During the 15 months all the wheels were turned and the axle boxes metaled up; and at the end of the period the engine was sent into the shop for a fortnight, when the chief repairs consisted of a new set of tubes, and the engine was again placed on her usual run of 375 miles daily, and bids fair to have completed her 200,000 miles at the end of this year. The engine is worked by one crew of men only. The boiler is kept in excellent condition by being blown out at the end of every trip, and is filled up by means of its own injectors using steam from a stationary boiler in the engine shed.

It is interesting to note that the hard deposit of scale in the boiler and the corrosion of the plates has been very much reduced in this and similar boilers by inserting a block of zinc. In this manner it is found that 20 pounds of zinc dissolves every month in a boiler undergoing hard work. But the absence of corrosion and the readiness with which the scale falls off amply repay this expenditure of zinc. The engine above mentioned was built at Crewe, in March, 1882, and is of the ordinary straight link type.

Wood Paving in Paris.

After giving macadam and asphalt a fair trial to replace the stones in the streets of Paris, wooden pavements to a very limited extent were resorted to some few years ago by way of experiment, but they turned out a failure. An English company, however, came over to show the Parisians how the thing is to be done. About a third of the Champs Elysees was last autumn paved with wood by the English company, and the result has been so encouraging that the Municipal Council of Paris have resolved to give the English system a more extensive trial. The French, who are quick to copy, are hard at work in paving some of the principal streets, such as the Rue de Rivoli, the Boulevards, Faubourg St. Germain, and the remaining portion of the Champs Elysees, and it is pleasant to see French and English workmen employed so harmoniously together.

Quassia Chips in Beer.

In the neighboring town of New Britain there is a factory for the production of quassia cups—the quassia wood being so intensely bitter that a cup of fresh water, if it is a quassia cup, will become very bitter in one minute, and these cups long have been in use in some families for this tonic quality they impart to water. The chips and shavings in the cup factory were thrown away or burned, until some of the lager beer brewers discovered that they were available in the place of hops for lager beer; then a demand arose for them, until now the proprietor of the shop is making more money out of his chips and shavings than he is making out of [illegible].—*Hartford Times.*

Remedy for Condensed Steam Showers.

In the business portion of many cities, during the winter it is impossible for a lady to pass through the streets without having her clothes sprinkled, and often spoiled, by the fair weather showers which she encounters beside every building furnished with an elevator or a high pressure steam engine of any kind, and other persons besides ladies feel the annoyance in a greater or less degree. The *American Architect* says: The remedy is so simple that it is a pity that its application should not be made compulsory everywhere, as it is in New York, where, notwithstanding a very general use of steam power in the business quarters, the exhaust showers are unknown. In that city no exhaust pipe is allowed under any circumstances to open directly into the atmosphere.

Where cheapness is the first consideration the law against open exhausts is complied with by placing an inverted cylindrical receiver or "kettle" over the mouth of the exhaust pipe, which projects just above the roof. The stream of mingled steam and water from the exhaust strikes the inside of the "kettle," and is there separated, the water attaching itself to the inner surface of the kettle, and dripping thence harmlessly upon the roof, while the light vapor, freed from its burden, passes off and is dissolved in the air. The use of these simple kettles, which cost but a few dollars, is open to the objection that the constant trickle of warm condensed water from them over the roof leads in time to the deterioration of the roofing material; and a better but more expensive device is used in many cases, consisting of a closed kettle, standing on the roof, and having its cover perforated with two holes, one of which receives the exhaust pipe, bent over and downward into it, while a short piece of straight pipe is inserted in the other. The exhaust steam is freed from its suspended water in this kettle, in the same way as in the other, and passes out as light vapor through the short pipe in the cover, and a small drip pipe leading from the bottom of the kettle conveys the condensed water into the nearest waste pipe or rain water leader.

The Coral Reefs of Cuba.

A study of the elevated coral reefs of Cuba has been recently made by Mr. W. O. Crosby, and his conclusion is that they indicate a slow subsidence of that island during their formation, and hence that Darwin's theory of the origin of coral islands is the true one. The reefs are in terraces along the sides of the island, especially on the northern and eastern sides of the island. The lowest terrace is 30 feet high, and varies in width from a few rods to a mile. It was obviously the fringing reef of the shore at one time. The second terrace rises abruptly from the level of the lower to a height of 200 feet to 250 feet. The third reef has an altitude of 500 feet; the fourth of 800 feet. These terraces run round the whole island, but are best preserved on the western part of the island, where the erosion has been less rapid, and on the summits of the highest hills. The hills about Havana and Matanzas, which reach a height of 200 feet, are entirely composed of reef limestone. In the mountain of El Yunque (the Anvil), five miles west of Baracoa, the reef stone is 1,000 feet thick, and composes the upper part of the mountain, the lower part being of slate and eruptive rocks. Originally the upper limit of this reef stone must have been 2,000 feet above the sea level. The Jamaica reef stones are of the same altitude, and it is probable that during their formation the Caribbean area was sunk until the Great Antilles were reduced to a few small islands.

ELEVEN new jute works are being erected in Germany, with fully 2,000 looms, and the new mills and extensions in Calcutta will add 3,000 looms to the present number, making a total of 5,000 additional looms in Germany and India.

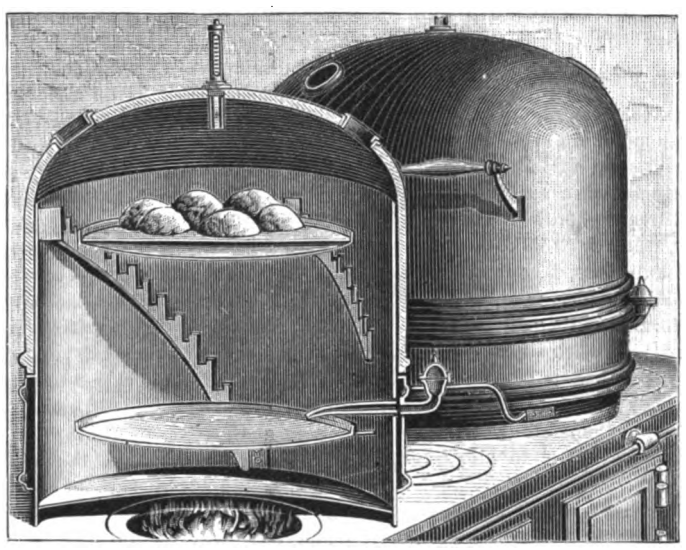
BREAD MAKING AT HOME.

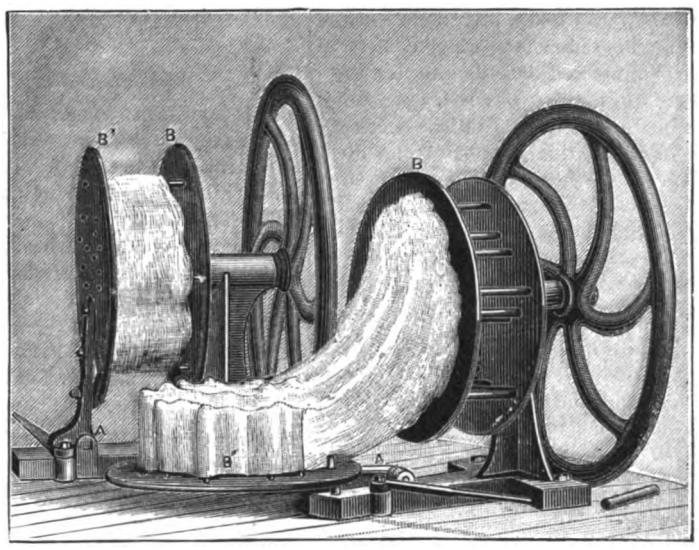
Visitors to the Jardin d'Acclimatation, of Paris, have recently seen in operation a curious system of domestic apparatus, which is being constructed by Mr. L. Dathis, and which consists of a portable oven and a kneading machine that permit of bread being made at home—something that will prove very advantageous for rural districts and localities that are far removed from centers of population.

The Portable Oven.—The portable oven (Fig. 1) consists of two principal parts, to wit: (1) of a cylinder closed beneath, which is placed upon the fireplace; and (2) of a dome-shaped piece which fits over the cylinder and serves as a cover for it. This cylinder contains three racks, that are designed to support two disks, which are isolated from its sides so as to give a circular passageway around them. The first of these disks is simple, and is placed at the bottom of the apparatus upon the last notch of the rack. The second, which is double and contains a stratum of air between its two faces, is placed above the other at heights varying according to circumstances and to the size of the objects to be baked. Finally, there is an injector, which serves, when the apparatus is closed, for leading a small quantity of water from the exterior and throwing it upon the bottom disk. This water at once produces steam, and the latter thereupon condenses in the form of mist upon the cold dough that has just been put into the oven. The effect of this is to brown the bread, pastry, etc., and help its expansion, and, when meat is being cooked, to render it more tender and juicy.

The cover of the oven is provided with an external layer of a non-conducting substance that prevents the contact of air with it, and that consequently keeps it from cooling. It is also furnished with the following accessories: (1) A thermometer for showing the internal temperature of the apparatus; (2) two sight holes for permitting operations to be watched; (3) two handles for lifting it off the cylinder; and (4) finally, in the apparatus of larger size, two rings to which are affixed a handle that is connected with a chain running over a pulley, so that the cover may be more easily lifted and kept suspended while the oven is being filled.

The heat entering at the bottom and stored up in the oven is distributed through the latter in two ways, one of them direct and the other reverberatory; that is to say, a portion of the heat rays traverses the disks and heats the underside of the objects, while another portion, finding a passage between the disks and the sides of the cylinder, rises to the dome and is radiated in all directions upon the bread or other material that is being baked.





NOVEL APPARATUS FOR HOME-MADE BREAD MAKING. FIG. 1.—THE OVEN. FIG 2.—THE KNEADER.

This furnace requires no special preparation for its reception, but may be placed, like a pot, over any fireplace whatever, even in the open air. It heats very easily, and its temperature may be raised to 250° in about twenty minutes. It serves not only for baking bread, pastry, etc., but also for roasting meat, poultry, etc.

The Domestic Kneading Machine.—What is an essential condition in kneading is not to compress the dough so as to render it compact and of bad quality, but to take care, on the contrary, to stretch it out and aerate it as much as possible in order to make it pliant, smooth, and light. Kneading by hand requires long practice and great care, and this is why it is rarely well done, and why people have poor success when they attempt to make bread at home.

The object of Mr. Dathis' apparatus is to overcome this difficulty, to do away with manual labor, and to permit an inexperienced person to make bread of an excellent quality without any trouble.

The apparatus, which is shown in Fig. 2, consists of the following parts, to wit: (1) Of a vertical disk, A, which is provided with pins, B, arranged according to certain radii starting from its center, and which is fixed upon a horizontal axle that is itself mounted upon a vertical support and provided with a flywheel and crank for rotating it; (2) of a second vertical disk, B', which is provided with pins that are arranged according to radii that differ from those of the other disk, so that one series may pass between the other and not touch during the revolution of the disks. This disk, B', is hinged so that it may be turned back into a horizontal position. Movable disks that have apertures corresponding with the pins in the disks, A and B, are placed in these latter. The purpose of these will be noted further along.

After mixing the flour with yeast, water, and the necessary accessories, by means of a spatula or otherwise, so as to make a compact ball of dough of it, the apparatus is opened and the mixture is placed upon the disk, B. The machine is then closed and afterward revolved until the dough has assumed the desired viscosity through the stretching and aeration that it has undergone between the pins of the disk, B, which form points of resistance, and those of the disk, A, which form points of rotary traction. The vertical position of the disks, A and B, offers the advantage that it causes the dough, which is always tending to fall by its own weight from one pin to another, to successively advance toward and recede from the center of rotation, and thus to become more regularly mixed.

When the operation is finished, and it is desired to remove the dough from the apparatus, it is only necessary to open the latter to take the movable disks in succession off the pins on which they are fixed, and to allow the dough to drop into the vessel in which it is to rise.—*La Nature.*

A New Method of Sewer Ventilation.

An English apparatus by Mr. T. S. Wilson, F.S.I., and Mr. H. T. Johnson, is called the patent hygienic furnace. Profiting by the proximity of the gas mains to the sewers, the patentees have constructed a gas furnace to be inserted in the manholes. The gas is introduced into a little chamber, where it is mixed with a due proportion of air and supplies some Bunsen burners. Immediately above the gas there are some fireclay plates, which soon become heated; while above them are iron divisions. The heat naturally draws the air up from the sewer below; it passes through the Bunsen burners backward and forward over the fireclay plates and iron divisions, till at last it finds its exit in the ventilation chamber or manhole, and hence through the grate into the street. The furnace not only causes a strong current of air from the sewer, but, as it is capable of being heated at from 600° to 700° Fahr., it should destroy all the germ life that travels with the sewer gas. Experiments with sterilized infusions of meat have been made, and whereas ordinary air drawn from the street soon caused the infusions to become turbid with animalcules and fungoid life, no such effect was produced by the sewer air taken after it had passed through this furnace.

The Rebuilding of Casamicciola.

A commission of Neapolitan engineers and architects, which has for some time been occupied in considering the best mode of providing for the future of the island of Ischia, has now closed its deliberations, which were approved by the general assembly of the profession. Their investigations were confined to the causes of the great disaster of Casamicciola from an architectural point of view, and to the best method of reconstructing the houses. During the investigation they were much struck by finding in the midst of the ruins a zone of about 300 meters square which had escaped untouched. There is not the slightest trace of the severe earthquake in this oasis—no house was damaged, and the walls of the gardens are intact. Wood and iron are recommended as the best materials to be employed for rebuilding the houses, and two types of this mode of construction were minutely examined—the one called the "Calabrese," consisting of wood and mason work on walls; the other, much used in America, consisting of iron. Preference was, however, given to the Calabrian type. One thing was decided—that vaulted roofs should be avoided in a country subject to continual shocks. The sum total of what has been collected for the sufferers in Ischia now amounts to 2,735,268 lire, or about 110 000*l.*

Progress in Wood-Working Machinery.

The great advances which have been made within a very few years in perfecting machinery for all kinds of wood-working are forcibly brought to mind in glancing over a beautiful illustrated catalogue just issued by Messrs. J. A. Fay & Co., of Cincinnati, O. The number and variety of machines shown, and the illustrations giving diagrams of different shapes into which wood can be worked—for carpenters and builders, cabinet makers, carriage makers, etc.—furnish a ready explanation of the rapidly increasing use of such machinery, and constitute of themselves a splendid memorial of the genius and skill of American mechanics.

PROFESSOR SYLVESTER, of Johns Hopkins University, has been called to the chair of mathematics in one of the colleges of Oxford, England. It is to be regretted that he has accepted the call, for by his departure the country sustains a loss that will not soon be made good.

"I" and "It."

It is one of Ruskin's pithy sayings that "the obstinacy of the mean man is in the pronunciation of 'I,' and the obstinacy of the great man in the pronunciation of 'It.'" This difference may be said to divide all energetic men and women into two general classes, those who are bent upon establishing themselves, and those who are bent upon establishing something which they hold more important than themselves. Each of these characters may be seen in every station of life, and in every occupation. Two men are performing the same manual labor with equal industry; one is calculating how much labor he need expend in order to satisfy his employer and keep his situation: the other, while fully conscious that he is earning an honest livelihood, is also interested in the outcome of his work, and is anxious to see it well done.

Two men are deeply engaged in politics; one puts forth all his force and ingenuity to secure for himself some coveted position; the other is equally energetic in pushing forward a needed reform, or in securing the best man for an important post, that the welfare of his country may be promoted. Two scientists are both earnest in maintaining a recent theory, or in diffusing a recent discovery; one because he hopes thus to lift himself into notice in the scientific world and be looked up to as an authority; the other because he firmly believes in it and desires that mankind shall benefit by it. Two artists are putting forth every power; one for the sake of fame, the other for the sake of embodying his conceptions and giving them to the world. Two women are capable teachers; one is planning solely to secure her own promotion; the other is incited by the idea of elevating and enriching the young minds intrusted to her care. Two others are diligently engaged in works of charity; one in the hope of being called Lady Bountiful; the other desiring nothing so much as to lift some of the heavy burdens of the poor, and to let in a ray of sunshine upon the afflicted. In every case the one is absorbed with the thought of "I," the other by the thought of "It." Though working apparently for the same purpose, and using perhaps the same methods, their aims and aspirations point in opposite directions, their hopes and fears are centered around different objects, and the success of either one alone would appear like failure to the other.

It may seem at first sight that, if the energy of each of these characters is equally expended in the same direction, the difference of their secret motives cannot concern any one but themselves. If their work is done, and done well, what more has society to ask? It will be found, however, that only to a certain point *can* any work be performed well when the aim is wholly selfish. There comes a time to each man and to each woman when his or her own interest and the excellence of the work *seem* at least to clash.

Perhaps a larger view would show that there really is no such conflict, that eventually the good of the worker and the good of his work will be identical. But at present, at least, we are not always able to take this larger view, and, whenever they *seem* to us to come into collision, one or the other must give way. The self-seeker has no hesitation. His own interest is uppermost in his mind, and if he imagines *that* is to be promoted by slacking his efforts or adulterating his goods, or giving short weight or measure, or catering to what he knows to be a corrupt taste, or sacrificing some public benefit, the die is cast, and society is by so much impoverished and injured. He who on the other hand keeps his eye fixed on excellence as the chief good, can stoop to none of these things. If his own interest is to suffer it must suffer, for he has higher hopes and nobler aspirations that he will not sacrifice. Whatever stands in the way of his best accomplishment must yield, and thus it is in every case the man who emphasizes "It," not he who emphasizes "I," who is of the highest value to the world. Every employer knows how to prize a conscientious subordinate who makes the employer's interest his own, and society will be dull, indeed, if it does not prize its conscientious servants, who in every walk of life make its best welfare and happiness their first and main concern.

This interest in our work, for its own sake, is a cultivatable quality. We all possess it in some degree, and we may all increase it if we will. Children may be accustomed at a very early age to take pleasure in the success of their own efforts, quite apart from any personal good they may derive from it. The careful observer of child nature will notice that this is a natural delight, and is only deadened and diminished by the growth of selfish considerations. If care is taken to make work as congenial as possible, to prevent its being excessive and exhausting, and to sympathize and encourage the natural joy of success, there is no reason why should ever decrease.—*Philadelphia Ledger.*

The Cannon, the Steam Engine, Man, and the Insect Considered as Mechanical Motors.

Under the above title, we give a resumé of some very curious and interesting information published in a recent work of Mr. E. Jouffret, entitled "Introduction to the Theory of Energy."

These examples, which are submitted in a simple and clear way, are well calculated for disseminating a knowledge of the phenomena of conservation and transformation of energy, by presenting them under a concrete form accessible to all those who are not making a special and continued study of them.

A 100-ton cannon (Italian model of 1879) costs 400,000 francs. It requires a 250 kilogramme charge of powder, and throws a projectile weighing 917 kilogrammes, with an initial velocity, at the mouth of the cannon, of 528 meters per second.

The energy possessed by the projectile, in the form of live power, is 12,772,000 kilogrammeters.

The energy represented by one kilogramme of powder is, according to Noble and Abel, 300,000 kilogrammeters, or 75,000,000 kilogrammeters for the charge of 250 kilogrammes.

The *cannon*, considered as a machine, converts then into work *seventeen per cent* of the total energy of the combustion of the powder. This figure is higher than that furnished by the best steam engines, as these convert into work less than ten per cent of the total energy represented by the coal.

It is the animal machine in which the performance is the highest, and this fact may be established, in a particular case, as follows:

According to the *Guide Joanne*, the ascent of Mont Blanc, starting from Chamounix, is effected in seventeen hours, resting spells not included. The difference of level is 3,760 meters. A person ascending, who has a mean weight of 70 kilogrammes, produces, then, in order to rise, a work of $3,760 \times 70 = 263,000$ kilogrammeters. This work is borrowed from the heat that the carbon and hydrogen contained in the food eaten disengages upon being burned in the lungs. For the sake of simplicity, if we reduce the entire energy to a combustion of carbon, and recall that a kilogramme of the latter furnishes 3,000,000 kilogrammeters, we find that the 263,000 kilogrammeters represented by the ascent correspond to a consumption of 94 grammes of coal—a consumption that comes to be added to the normal rations necessary for the operation of the organs during a state of rest. Such consumption is 8·35 grammes per hour, or 142 grammes for the seventeen hours. The total consumption of coal is 256 grammes, representing 708,000 kilogrammeters. The performance, then, is

$$\frac{263,000}{708,000} = 37 \text{ per cent.}$$

The performance of the human machine drops to 21 per cent when we consider a period of twenty-four hours composed of ten hours of work and fourteen of rest, and a mean daily work of 280,000 kilogrammeters.

The cannon, considered as a machine, is incomparably superior to the steam engine as regards the time necessary to produce a given quantity of mechanical work.

Thus, for example, the 100-ton cannon develops in *one-hundredth of a second* a quantity of work equal to that which would be yielded by a 47-horse power steam engine *in one hour*. A man of average strength is still lighter than an ordinary steam engine of equal power, but he is much inferior to the other animals of creation, and particularly to insects.

Thus, for example, the libellula, which is capable, without apparent fatigue, of following a train of cars for several hours, giving its wings during this whole time some thousands of backward and forward motions per second, is a hundred times lighter than a steam engine capable of producing an equivalent work.

This is what renders the problem of aerial locomotion so difficult, and, as Mr. Hiru says, it explains why we can fly in imagination only.—*La Nature.*

Microscopic Examination of Water.

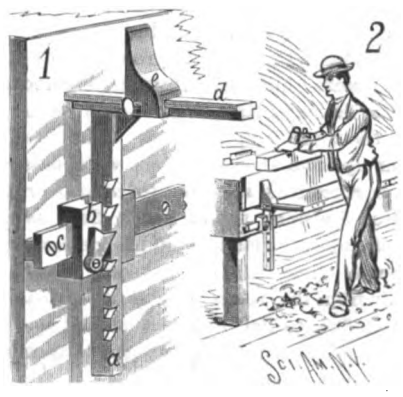
J. Brautlecht produces a precipitate in the water by adding to 100 c. c. 5 drops of a solution consisting of one part aluminum sulphate, one part hydrochloric acid, and eight parts water, followed up by one to three drops of liquid ammonia. The precipitate settles readily, and after decanting off the clear is collected upon a smooth filter, stroked off with a glass rod, and thus transferred to a test tube, in which it is dissolved in ten to fifteen drops of dilute acetic acid. The clear solution is examined with the microscope, at first alone, and then after the addition of a solution of saffranine. By adding one-half per cent of gelatine, permanent preparations may be obtained on Koch's principle.—*Rep. Anal. Chemie und Chem. Zeitung* (*Cœthen*).

The Parasite of Malaria.

The observations of M. Richard seem to affirm those of Leverau; he found in the red corpuscles of the blood of persons suffering from acute malaria a parasite of oscillating form moving very rapidly, and sometimes disengaging itself from the globule. These parasites have been met with in a number sufficiently large to obstruct the capillary vessels, and to explain many of the symptoms of intermittent fevers. It has also been proved that the culture of these parasites in a fertile gelatine basis can be brought to an immediate cessation if a two per cent quinine solution is added.

STOCK REST.

A convenient, portable, and simple stock rest for the use of carpenters has recently been invented by Mr. James McVane, 2 Shawmut Place, Boston, Mass. The vertical main bar, *a*, is formed with a series of notches so that it may be held at any elevation by the pawl pivoted to the block, *b*, the bar sliding in the dovetailed groove in the block. The block is formed with a horizontal T-shaped groove which fits upon the guide rail, *c*, which is made in sections so as to be conveniently packed in a tool chest. The upper end of the vertical bar is provided with a cross head, *d*, that supports the timber being worked and that is made T-shaped in cross section in order to carry the dog, *e*, which holds the timber upon the cross head against lateral movement. A set screw holds the dog in place. The guide rail is secured to

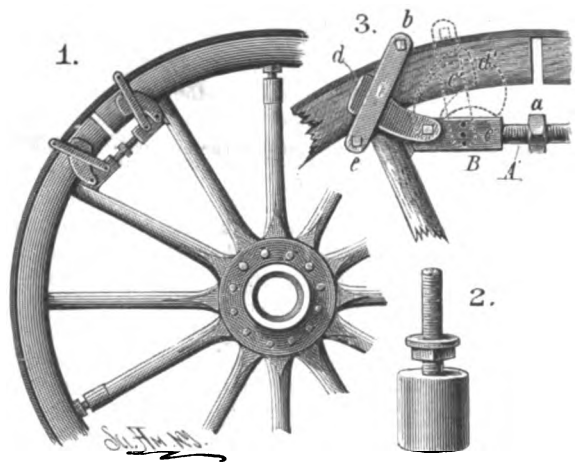


McVANE'S STOCK REST.

the side of the bench as shown. The block, *b*, and guide rail, *c*, may be made of cast iron and the other parts of malleable cast iron. Constructed in this manner it will readily be seen that the rest can be adapted to all the adjustments necessary, and the changes can be rapidly and easily effected. In addition it can be detached from the bench, taken apart, and packed in a small space in the tool chest.

FELLOE AND SPOKE TIGHTENER.

This invention provides means for tightening or taking up the play in felloes of wheels so as to avoid the necessity of resetting the tire in the ordinary way, and also provides for making the spokes fit tightly between the felloe and hub. There is a right and left threaded screw, represented at A, having an angular head, *a*, midway of its length, and upon the threaded ends screw two bars, B, provided respectively with right and left hand threads. The bars may be of iron and have the threads formed in them, or they may be of wood simply bored and provided with straps embracing two or more sides and having the threads formed in the portions which are at the inner ends of the bars. At *d* is shown a plate having its inner surface gouged out and serrated, and at one end provided with a slot to allow for adjustment in connecting the plate. Two of these plates are attached to the outer end of each bar, B, by a bolt and nut, thereby forming a pair of clamping jaws. A clamp-



GALBRAITH'S FELLOE AND SPOKE TIGHTENER.

ing bar having bolt holes at its ends is shown at *c* and *c'*. Two of these bars are attached to each bar, B, between the jaws and the inner end by a bolt, *e'*, and by aid of a bolt passing through the holes in the other ends forming a pair of clamping bars for holding the apparatus in place, as shown in Fig. 1. The bars are also intended for use to clamp across the ends of the clamping jaws, *d*, which are thereby held securely against the felloes when the tightener is to be used to draw the felloes together. The outer end of each bar, B, is provided with a cushion of some soft material in order that the surface may not be injured.

To use the apparatus the cushioned ends of the bars are placed against the spokes and felloes and the clamping jaws, *d*, arranged as in either Fig. 1 or 3. The bars, *c*, are then placed on each side of the felloe and over the jaws and secured by the bolts, *e* and *b*. The device can be arranged with the clamping jaws in the position most convenient, and the felloes can be tightened by either a drawing or pushing motion, as most desirable. The felloes are tightened by turning the screw, *a*, either in one direction or the other. When drawn together, the space between the felloe and tire is filled by thin perforated pieces of any suitable material put in with any cement or with barbed tacks to hold them in place. A hoop tapering toward the ends can be used. By turning the screw in the opposite direction the felloes are pushed away from each other, and the joints thus formed are filled with a suitable material.

The device obviates the necessity of leaving home to visit the smith, as one of ordinary ability can screw back the nut, put in the material, and screw up again. The exact amount of pressure needed can be put on each place, thus preventing dishing or straining. The felloes are not scorched so as to be in a condition to soak water. When not in use otherwise, the nut and right and left threaded screw bolts constitute a pressure jack.

The spoke tightening device shown in Fig. 2 consists of a cup made of suitable substance, covered to prevent it from chafing the wood, and of a size to fit over the end of a spoke. Extending through the cup is a screw bolt provided with a nut. The cup is applied to the end of the spoke, one end of the bolt entering the spoke and the other entering the hole in the felloe from which the spoke tenon has been removed. The felloes can be either drawn in or shoved out by turning the nut one way or the other. Instead of using a cup the bolt may be made as a cup to set over the spoke, and the nut is made with a flange having holes for screws by which the nut is held to the felloe. In case there is not room enough for the device between the spoke and felloe, the spoke may be cut off.

This invention has been patented by Mr. Archimedes Galbraith, of Amadore, Mich.

Polishing and Preserving Parquet Floors.

The finish and care of hardwood or parquet floors has been and is now a source of great trouble and annoyance to housekeepers, except in cases where the owners have taken the trouble themselves to look the matter up, or have instructed their architects to be particular about that item. It is too bad that where beautiful floors have been laid, in so many cases they have been left to be finished by persons who have not troubled themselves with finding out the best method of finishing. The usual way for such persons to do is to treat them with shellac or varnish, which is all wrong, as a moment's thought will convince any one that a surface that is constantly walked over needs something different to the coating of gum that is left on the surface after the spirit used in dissolving the shellac or varnish is evaporated.

This coating becomes, then, brittle, and is ground up into minute particles by the nails in the boots, and swept away, leaving the wood bare right where it is most exposed to view. As a matter of course, the beauty of the floor is soon gone, and instead of being an attractive part of the furnishing, the sanitary consideration very often is about all that keeps one from nailing a carpet over the whole floor. Others use linseed oil, and everybody knows that an oil finish is one of the best methods of finishing wood, but the objection to that method is that each time the oil is applied it darkens the wood, and in a short time the different kinds of wood are of the same color. Now the question arises, Which is the true and only way of finishing floors properly? and the answer is, by the use of hard wax, which, however, must be so prepared that the trouble of applying it, and the stickiness attending ordinary beeswax and turpentine, are entirely obviated. The wax is treated with special liquids and made into a preparation.

The writer has tried many things and found this hard wax to be the most satisfactory in its results. It is so simple, that when once the floor has been properly filled and finished with it, any servant can renew and keep the floors fresh and bright as long as the wood lasts, and it does not materially change the color—the wood always retains its beauty. An application about once a year is all that is necessary, if the floors are rubbed over, when a little dull, with a weighted brush or cloth. In repolishing old floors that have been in use for a length of time and become dull looking, it is only necessary after they have been cleaned to rub on a thin coat of the hard wax finish with the brush or cloth, as stated before. If the floors have been varnished and the varnish is worn off in places, as mentioned above, the best way is to have the varnish scraped off, and then a thin coat of the hard wax should be applied and treated as the new wood after it is filled. But if it is inconvenient to have the floor scraped, or the expense too much, the main object being to restore the color in those places which are worn and defaced, the following mixture is recommended: One part linseed oil, one part liquid drier, and two parts turpentine. A cloth should be dampened with this and applied to the worn and defaced places, which will have the desired effect. After being wiped off clean it ought to dry twenty-four hours, and then polished with the hard wax finish. It is very important never to use the wax over oil that is not thoroughly dry, as the floor would invariably be sticky. Finally, it would be well to mention that hard wood or parquet floors should never be washed with soap and water, as it raises the grain and discolors the wood.

After the floors have been properly filled and finished with the hard wax, dirt will not get into the pores, but stays on the surface, and consequently can be removed with a brush or cloth; or, if necessary, dampen cloth with a little turpentine. This will take off any stain from the finish.—*Decorator and Furnisher.*

Practical Hints Regarding Tornadoes.

JOHN D. PARKER, U. S. A.

The following hints regarding tornadoes are given in the belief that many people are killed every year who could save their lives by a little practical knowledge of the movements of these destructive storms.

The tornado *season* is embraced between the 1st of April and the 1st of September, but in the latitude of Kansas City most tornadoes occur in the months of May and June. As we go north or south of this latitude they are proportionally earlier or later, and early or late seasons vary the time of their occurrence correspondingly.

Tornadoes occur in the *afternoon*, generally between two o'clock and evening, four o'clock being called the tornado hour.

Tornadoes move from southwest to northeast, generally *east about twenty degrees north*, and their linear movement is ordinarily from thirty to forty miles an hour.

Tornadoes occur on *sultry* days, or when the temperature is very high and the air is thoroughly saturated with moisture.

Tornadoes occur when the *electrical conditions are high*, or when the air is highly charged with electricity.

The approach of a tornado may be known by ominous clouds appearing in the southwest and northwest. The clouds sometimes resemble the smoke of a hay stack, at other times they appear like iridescent fog. Sometimes they present a deep greenish hue, or are intensely black, or have a purplish, yellowish, or bluish tinge. When these two masses or banks of clouds, under the impulse of opposing currents, approach each other they are thrown into great confusion; there is a roaring, likened to the rumbling of distant thunder, and an upward expulsion of air and vapor. Soon the funnel of the tornado is let down to the earth and moves to the front, while scuds of clouds play around it. The tornado now formed has four characteristic movements: a linear movement toward the northeast; a gyratory movement (north of the equator), contrary to the hands of a watch; a zigzag or swaying movement, which leaves dentatee edges in the path of the tornado; and a rising and falling movement, the poise of the upper current, by which the tornado leaps over portions of its path.

If one is familiar with these premonitory signs he is put on his guard, and when the tornado appears, he is prepared to act intelligently and promptly. Under the preceding principles he can easily determine the projected path of the tornado, from the location of the funnel, and whether it will be necessary to run north or south to escape from it. He must, of course, not run east or west.

When a tornado is imminent, certain precautions should be observed. Doors and windows in houses should be closed, animals in harness unhitched, and animals in stables let out. The safest place in a house is the southwest corner on the first floor, or better perhaps, the southwest corner in the cellar. If a tornado overtakes one on a prairie, lie face downward, head toward the east, and place the hands over the head for protection. If near a low solid object, like a large stone or stump, lie face downward, east of it, head toward the object, with hands over the head for protection.

Every home should have a dug out at a convenient distance from the house, or, what is better, a tornado room built into the west or south wall of the cellar, large enough for the family, and for things of great value like deeds or money.

The destructive effects of tornadoes result from the gyratory movement, which is estimated at from one hundred to five hundred miles an hour. Tornadoes with the hour glass form of cloud are the most intense, and seem to be irresistible, but the greater number of tornadoes are of a lower intensity and we can build against them. Frame houses are more tenacious or elastic than brick or stone, and when overthrown are not so destructive to life. They should have strong frames. Brick houses should have an extra layer of brick laid in cement in the west and south walls. Some houses with very thick walls laid in cement are comparatively safe against most tornadoes.

Houses built near a hill or bluff presenting an elevation should be located on the northeast side, as the elevation tends to lift the tornado over the house. A grove of hard wood, such as oak, maple, walnut, and hickory, southwest of a house, or a forest southwest of a town, has a tendency to break the force of a tornado and drive it into the upper air, although it is not safe for a person to be near a tree or in a grove during a tornado for fear of being struck by flying timber. Occasionally a tornado of great intensity will cut a clean swath through a grove, but forests tend to break the force of tornadoes, and will drive most of them into the upper air. All towns in prairie States should plant heavy groves of hard timber southwest of them. During a residence of forty years in southern Michigan when it was heavily timbered, tornadoes were unknown, that is, they were driven into the upper air and rendered harmless; but since the forests have been cut away tornadoes in that part of the State have become somewhat frequent and destructive. Not to build and protect against tornadoes seems like not taking medicine for fevers. Sometimes a fever proves fatal, but most fevers can be cured, and so most tornadoes can be rendered comparatively harmless.

By a careful study of the principles which underlie these storms, and an observance of the premonitory signs, during the tornado season, it is believed that few if any persons, who keep their presence of mind and act intelligently and promptly, when the storm appears, need be killed by a tornado. Still it is always best to have a clear conscience whatever may happen.

Meteorologists are carefully studying these storms. The Signal Service already, in their daily reports during the season, indicate the barometric trough of low pressure, extending from the southwest toward the northeast, along which tornadoes move, and it is believed that the time is not far distant when they will predict to certain districts probable tornado days.—*Kansas City Review.*

The Suez Canal.

The following is the statement of the tonnage which has passed through the Suez Canal in the last four years, with receipts and profits:

Years.	Gross Tonnage.	Net Tonnage.	Gross Receipts, Francs.	Net Profits, Francs.	Percentage Dividend on Capital.
1879	3,236,912	2,263,333	80,949,148	2,744,880	5·974
1880	4,344,519	3,667,421	41,830,899	12,330,142	9·337
1881	5,794,401	4,136,779	54,696,189	24,678,846	13 700
1882	7,122,125	5,074,808	63,409,593	31,674,318	16·240
½ 1883	4,305,862	Not yet reported.			

The New British Standard Wire Gauge.

DENOMINATION OF STANDARDS.

Descriptive number.	Equivalents in parts of an inch.	Descriptive number.	Equivalents in parts of an inch.
No.	Inch.	No.	Inch.
7—0	·500	23	·024
6—0	·464	24	·022
5—0	·432	25	·020
4—0	·400	26	·018
3—0	·372	27	·0164
2—0	·348	28	·0148
0	·324	29	·0136
1	·300	30	·0124
2	·276	31	·0116
3	·252	32	·0108
4	·232	33	·0100
5	·212	34	·0092
6	·192	35	·0084
7	·176	36	·0076
8	·160	37	·0068
9	·144	38	·0060
10	·128	39	·0052
11	·116	40	·0048
12	·104	41	·0044
13	·092	42	·0040
14	·080	43	·0036
15	·072	44	·0032
16	·064	45	·0028
17	·056	46	·0024
18	·048	47	·0020
19	·040	48	·0016
20	·036	49	·0012
21	·032	50	·0010
22	·028		

On andafter March 1st next no other wire gauge can be used in trade in England, that is to say, no contracts or dealings can be legally enforced which are made by any other sizes than those above given.

High Steeples.

The following are the heights of a few of the tallest steeples:

	Feet.
Pisa, leaning tower	179
Baltimore, Washington Monument	210
Montreal, Notre Dame Cathedral	220
Boston, Bunker Hill Monument	221
Montreal, English Cathedral	224
Paris, Notre Dame	224
Bologna, leaning tower	272
Cairo, minaret of Mosque of Sultan Hassan, highest Mohammedan minaret in the world	282
New York, Trinity Church	284
Florence, Campanile, or Giotto's Tower	292
Lincoln, Cathedral	300
Washington, Capitol	307
Venice, Campanile	322
New York, St. Patrick's Cathedral (to be when completed)	330
Utrecht, Cathedral (formerly 364)	338
Florence, Cathedral	352
Milan, Cathedral	355
London, St. Paul's	365
Brussels, Hotel de Ville	370
Lubeck, Cathedral	395
Antwerp, Cathedral	402
Amiens, Cathedral	422
Hamburg, St. Michael's	428
Landshut, St. Martin's	435
Cairo, Pyramid of Chefren	446
Vienna, St. Stephen's	449
Cairo, Pyramid of Cheops (original height 480)	450
Rome, St. Peter's	455
Rouen, Notre Dame	465
Strassburg, Cathedral	468
Hamburg, St. Nicholas	473
Cologne, Cathedral	511
Washington Monument (to be)	555

Alizarine Blue.

This bright and solid blue is manufactured by the Badische Anilin und Soda Fabrik, in the form of paste, containing from 10 to 12 per cent of the dry material. The great obstacle to its use has been its slight solubility in water, but this objection has recently been removed by combining it with the bisulphite of soda in a way which, according to the *Textile Record*, is described in the *Moniteur de la Teinture*.

The paste is intimately mixed with a concentrated solution of bisulphite of soda, specific gravity 1·25, and the mixture set aside for a week or two. It is then filtered. The alizarine blue, which has not been transformed, remains on the filter. The now soluble portion is found in the filtrate. It may be separated either by precipitation with a solution of common salt, or by crystallizing out by evaporation at a low temperature. The result is a reddish brown powder composed of microscopic crystals, which may be heated to 150° C. without their undergoing decomposition. The powder is known in commerce as alizarine blue S. It is excessively soluble in water, but slightly so in concentrated alcohol. In the state of aqueous solution it is much less stable, its decomposition beginning to take place at 60° C., and if the solution be boiled the whole of the alizarine is precipitated in the primitive insoluble form.

At ordinary temperatures the combination of alizarine blue with bisulphite of soda can be mixed with a solution of acetate of chrome without producing the least precipitate, but if heat be applied and the temperature raised to 60° or 70° C., the chrome lake of alizarine blue is formed. It is to this property of alizarine blue S. that we may ascribe the success which has attended its application in calico printing. For that purpose the following composition is largely employed:

120 grammes solution of starch of 10 per cent.

15 to 20 grammes alizarine blue S.

20 to 30 grammes solution acetate of chrome 20° Baume.

Steam printed cloth from ten to twenty minutes, and the color will be developed. Wash, soap, and dry. To steam under pressure is useless but not injurious.

This combination of alizarine blue produces a coloring matter which, once fixed on the cloth, perfectly resists the action of light, of soap, and even of chlorine. In this respect it is superior to indigo, all the shades of which it will give.

So much does it differ from the ordinary alizarine blue in its solubility that it can with difficulty be obtained in the form of crystals. Before crystallization is complete, decomposition begins; small quantities of the insoluble blue are precipitated, and the liquid when filtered is found to be richer in the bisulphite. Analyses of the pure product obtained by precipitation with common salt show that one molecule of alizarine blue is combined with two molecules of bisulphite of soda, and that the combination has for its formula, $C_{17}H_9NO_4 + HNa2SO_3$.

The mode of formation of insoluble alizarine blue strongly warrants the assumption that this body belongs to the anthracene series, of which its power to combine with the bisulphite is a new proof. Alizarine and purpurine do not furnish analogous compounds, while with the quinolines combinations very well crystallized are obtained. Of that group alizarine blue certainly possesses the characteristics.

Extensive Mining in Montana.

The enormous mining enterprises carrried on in our Western States and Territories, and the vast cost for machinery and fuel employed in working the mines, seem almost incomprehensible to persons unacquainted with such matters. A correspondent in Montana gives to the Chicago *Tribune* an account of the mining operations in one section of that Territory. Near the Anaconda, says the writer, is the Colusa mine—also copper. It runs its ore directly into smelting works of its own. For the year ending September 1 it had shipped 8,100 tons for export, which averaged 65 per cent copper and 55 ounces silver per ton. Within five minutes' ride of the Anaconda are the Lexington, Alice, and Moulton, all silver mines. The first named, after yielding $1,800,000 to its owners, was sold to a French company for $3,000,000. It runs sixty stamps. Its works cover several acres. Its monthly production of silver bullion now averages $1,106,000—about half profit. The Alice Mine produces $100,000 monthly, the Moulton, $65,000, the Silver Bow Company, $35,000, and so on through a long list of smaller properties, until the mind is bewildered, and millions begin to seem the unit of counting. The shipments of gold and silver bullion, chiefly the latter, average about $500,000 a month. The weekly shipments of copper ore and matte—as the product after smelting is called—averages 100 car loads, or about 3,000 tons, per month. There are 40 mines equipped with steam hoisting machinery, and over 100 smaller mines, all worked at a good profit.

While individuals by prospecting have made valuable discoveries, and attained a moderate competency, the great results mentioned above are only possible where enormous capital can be commanded for the development. Most of these great mines were sold by their first discoverers for $30,000 and less. Then capital stepped in and began its work. One of those above expended $1,700,000 in preparation. One paid $95,000 freight on the machinery and material for its buildings. The silver ore in its reduction requires a ton of salt to each ten tons of ore. The salt costs $30 per ton. Each "pan" of 3,000 pounds of the ore prepared for the action of quicksilver requires 300 pounds of the latter article every hour. Wood costs $6.50 a cord. The Alice, Lexington, and Moulton burn 3,300 cords per month. One mine returned $100,000 to the assessor as the value of its wood on hand. The Colorado and Montana smelters consume each 25,000 cords per year. Coke is brought from Pennsylvania for the smelters, and coal from Utah. The mines and reduction works employ about 2,500 workmen, and their weekly pay roll is about half a million dollars.

THE Chihuahua *Enterprise*, published in New Mexico, quotes dressed sheep to be worth in Chihuahua 75 cents apiece at the present time, 25 cents for a hind quarter, and 12½ cents for the fore quarter. The pelt of a sheep is worth 75 cents. From the tallow is realized from $1 to $1.50. Each sheep killed is worth $2.50 to $3.00.

ENGINEERING INVENTIONS.

A simple duplex rotary steam engine is the subject of a patent recently issued to Mr. L. D. Hooper, of Coffeyville, Kas. The improvements relate to the construction of the different parts of the engine, and the inventor claims that its effective working is greatly enhanced thereby.

A traction engine guide mechanism has been patented by Mr. Gustav A. Thode, of Holstein, Iowa. It consists of a pivoted axle carrying the steering wheels, provided with a tongue connected with an endless chain passing over sprocket wheels, so that the axle may be turned to one side of the engine or the other.

An improved automatic car coupling device has been patented by Mr. E. H. Cady Tompkins, of Glen's Falls, N. Y. It provides for holding the link in position by springs, arranged in slots in the walls of the drawheads, so that sufficient allowance will be made for the swaying of the cars, but the link will always be properly presented. The coupling pins have offsets, by which they may be held in suspension. The device is simple, readily applied, and easily operated.

Mr. C. J. Fortson, of Washington, Ga., has recently patented a pin and link car coupling in which the pin is supported for automatic coupling with a link by a gravity catch. A shoulder which supports the pin is located between the pivot and the long end of the catch, and is adapted to support the pin regardless of the weight of the catch. A comparatively light or small catch can be used, which dispenses with the necessity of a large chamber in the drawhead, therefore making it easier to support the link in a horizontal position.

Messrs. William V. Brown and Thomas S. Poole, of Arcadia, N. S., Canada, have patented an improved car coupling, to be used on cars of varying height, and also in connection with couplers at present in use, being especially adapted for going around curves or on up and down gradients. A joint is made in the drawbar, so that the outward end may swing up and down, but is arranged to be held in place by a spring. The link socket is widened at the rear, so that a block and screw hold up the pin for self coupling, or when the pin is down, and the link coupled, the spring presses it forward in position for tripping the pin in the other drawbar.

MECHANICAL INVENTIONS.

Mr. John R. Connor, of Franklin, Pa., has patented an improvement in sheet metal riveting machines. The invention is for heading rivets in sheet metal by a continuous and partially automatic operation, and the patent contemplates the running of the machine by motor power as well as by foot power.

A damper for stove pipes and drums has been patented by Mr. Fredric C. Davis, of Auburn, Ind., which, by arranging and connecting sectional damper plates, causes, when desired, a deflected or retarded current within the pipe or drum, and against its surface, thus effecting considerable economy in heat.

Mr. John Z. Gifford, of New York city, has patented an improved hoop flaring machine to facilitate the working of metal hoops. It consists of properly arranged rolls and gearing, so that the rolls adjust themselves to varying thicknesses of hoop iron, and exert a pressure increasing automatically with the thickness of the iron. The rolls have a screw adjustment at one end, and different bearings, spring and screw, at the other.

A printer's galley for providing a simple means for locking up matter, in either newspaper or job offices, has been patented by Mr. Nicholas Roemer, of Quincy, Ill. It provides for a longitudinal side bar, set by a thumb nut at the head of the galley, and engaging in a cross stick at the foot, so that the locking bar can be readily adjusted for any breadth of column. For locking a partly filled column, a clamp is applied to the locking bar.

A link bending machine has been patented by Mr. Charles O. Sobinski, of St. Louis, Mo., designed to cut from a rod of metal a section with tapered ends and bend it around in oval form, to constitute a complete link, with the exception of uniting the two tapered ends, which are subsequently welded together. The machine has a shear to cut off a section of rod, then a rising and falling former gives it the shape of the link, after which a pair of advancing and receding jaws bend the link section around the former, and a pair of nipping jaws and swaging block bend the ends inwardly and swage them together ready for welding.

An improved dry ore concentrator has been patented by Mr. J. G. Vollmer, of Austin, Tex. This machine is fitted out with a screw for separating the pulverized ore and sand from rocks and other worthless matter. The sand and pulverized ore is conducted to the proper place to be dried by the heat from fire in a box below, or by the steam or hot air introduced through pipes from a distance. The sand and ore is then conducted on to suitable screens, ore beds, etc., during which it is subjected to a strong current of air which serves still further to effect the thorough separation. With this machine a large quantity of ore can be concentrated in a short time and with little cost. There is no expense for a motor, as the ore to be concentrated works the machine itself.

AGRICULTURAL INVENTIONS.

A stump pulling machine has been patented by Mr. Orren A. Anthony, of Mayfield, N. Y. It is so constructed that in operation it tips the stump out of the ground sidewise, thus carrying less soil; it is comparatively cheap, easily handled, and strong and durable.

A grain thrasher and separator has been patented by Mr. Ole O. Graves, of Highland, Dakota Ter. It has removable tooth bars and plate, and removable rack below, and with the winged beaters is a vibrating rack having inclined cross slats with fingers, whereby the straw is carried back and the loose grain is shaken from it.

An improved cribbing plate, a practical device to be placed on horses' teeth, has been patented by Mr. August Quinque, of Harleysville, Pa. It consists of two slightly curved steel plates, with loops adapted to hook over the teeth, and lugs through which screws pass for drawing the plates together and causing the hooks to grasp the teeth of the horse.

Feeders for grinding rolls are the subject of a patented improvement by Mr. Gardner B. Root, of Amherst, Wis. The object is to secure even feed of material to grinders, the feeder having shell attached to hopper, with cross slots in the bottom, and an interior shaker, worked by the movement of one of the rolls, so as to evenly distribute the material to be ground.

Mr. Robert Griswold, of Woodey, La., has patented an improved apparatus for unloading hay and grain. It consists of a portable platform, with ropes attached at one end to the upper edge, and with snap hooks to engage with rings on inner edge of a netting on the wagon rack beneath the load. The draw rope also has snap hooks, and is constructed with branches of graded length.

Draught attachments for plows form the subject of a patent issued to Mr. Heinrich Raaths, of Appleton, Wis. By this invention the trace rods may, by a simple arrangement, be so changed as to narrow or widen the furrow cut, and the contrivance of the frame is such that, should the plow strike an obstruction, the evener is moved to the right or left, so as to change the position of the line of draught and carry the plow around the obstruction.

Mr. Chapman E. Gage, of Whitehall, Wis., has patented an improved grain screen, by which wheat may be separated from oats. Through a sheet metal plate perforations are made by punching down tongues, while in advance of the perforations depressions are made in the surface of the plate, forming grooves; the tongues punched down are drawn out and so shaped that the wheat grains coming through the perforations are projected forward, while the oats, being longer, are thrust up the inclines at the back of the perforations.

A patent has recently been granted for an improved seed planter and fertilizer distributer. In this machine the peculiarity consists in the wheels being constructed out of metal and without tires, and with spokes having enlarged ends to prevent them from sinking deep into the ground. The machine is further provided with a revolving hopper having a series of circumferential holes through which the grain or fertilizer passes when the machine is in operation, and by means of which the amount of grain to be deposited in the ground is regulated. The inventor of this improved planter is Mr. Cornelius Young, of Selma, Ala.

A very efficient machine for scouring, brushing, and separating wheat and other grain preparatory to the grinding, has been patented by Mr. John T. Ewan, of Bethalto, Ill. The two brushes or scouring cylinders are journaled one above the other in perforated casings, into which the grain is discharged from above, the grain being compelled to traverse the whole length of both cylinders in its passage through the machine. Before entering the casing and all the while during its passage through the machine, the grain is subjected to the action of a strong draught or current of air, which is maintained by the exhaust fan, and which separates and carries off the dust and other impurities mingled with and detached from the grain.

Letters patent have been issued to Mr. Heber Parish, of Burlington, Iowa, for an improved grain separator and cleaner. In this machine the separator and cleaner is made in two parts, each part consisting of a set of parallel serrated bars, and each being connected with a crank shaft in such a way that they will exactly balance one another and the two sets will successively move upward, backward, downward, and forward, the bars of each set raising the straw and carrying it forward and lowering it to the other set, separating the grain and carrying the straw toward the rear of the machine, while the grain falls through on to a sieve below, where it is acted upon by a blast from the fan blower. Devices are further provided for adjusting the sieve.

MISCELLANEOUS INVENTIONS.

A fireproof partition block, with depressions in the surface, so that mortar or plastering will adhere firmly, with the manner of forming same, and the mould therefor, in which wire or cord netting is employed, has been patented by Mr. Martial Lapersonnerie, of New York city.

A sheet metal roof valley, made in sections, forms the subject of a patent granted to Mr. Charles B. Cooper, of Nashville, Tenn. The sections have lugs at their upper corners, preventing the overflow of water, upwardly projecting beads on sides and upper ends, and downward at lower edge, the whole to be readily attached and prevent water overflowing and getting to roof boards.

Mr. A. Floyd Delafield, of Noroton, Conn., has patented an improved electric battery, in which the box for receiving the cells is provided at the ends with pintles or trunnions resting on a frame; this permits the cell box to be tilted or inclined, so that the superfluous liquid can run from all the cells at the same time, and the level will be the same in all. The invention also covers a cell with a boss on each side and on the bottom, to prevent surfaces from coming in contact with each other or sides of the box.

Mr. Orlando B. Jennings, of Honey Creek, Wis., has patented some improvements in the manufacture of sugar from sugar cane, sorghum, maize, etc. For cane sugar the invention contemplates reducing the cane to a dust-like fineness, whereby the juice cells are thoroughly crushed and ruptured, and for this he provides for a combination of circular saws, and sprinkles or mixes with the finely divided cane, before defecation, dry lime or lime whitewash in powder. After subjecting to a temperature of not less than 212° F., although it will average from 228° to 267° F., according to ripeness of the material, the juice is removed from the woody or precipitated matter by washing with water, for which a specially contrived vessel and appliances are used.

In Illinois, during the year 1882, 8,730 life insurance policies were issued, covering $22,566,715 of insurance. During the same period the citizens of that State paid $3,461,361.35 of premiums on policies, and received $1,414,-152.18 in payment of losses and claims. A comparison of the business transacted in the State during 1882 with that of 1881, shows an increase in the number of policies issued of 853; an increase in amount of insurance effected of $2,082,420 an increase of amount of premiums received of $490,681.59; and a decrease of losses and claims paid of $309,201.46.

The earthquake at Ischia has involved French and Italian life insurance companies to the tune of $100,000 or more.

The Travelers' Insurance Company, of Hartford, have assets amounting to nearly $7,000,000, and a surplus of over $1,700,000. This is the oldest and strongest accident insurance company in this country.

The Mutual Life Insurance Company, of New York, still leads all the other companies, having nearly $100,-000,000 of assets.

Financial.

The Treasury Department is receiving daily called bonds bearing assignments witnessed by cashiers or presidents of national banks, but not verified by the bank's seal. Heretofore the signatures of bank officers have been certified by Treasury officials after comparison with the signatures on file in the office of the Comptroller of the Currency and known to be genuine. It has been decided, however, that this practice involves too much risk, and hereafter when the seal of the bank is missing the bonds will be returned to the senders.

Judge Bond, of the U. S. Circuit Court of Virginia, has decided that State coupons are legal tender for taxes. The case will be carried to the U. S. Supreme Court.

The Director of the Mint, in his report just published, states that $3,800,000 has been credited to the silver profit fund during the year ending June 30, 1883.

Post, Wales & Co., 72 Broadway, New York, make a specialty of investment securities.

Manufacturing Notes.

The Pope Manufacturing Company, of Boston, have had to enlarge their factory at Hartford, Conn., as during the last summer they were unable to supply the demand for their bicycles and tricycles.

The Jarvis Furnace, Boston, has been extensively used in South America and the West Indies. It utilizes all kinds of waste fuel like wet peat, wet sawdust, wet tan, etc., and is used with great advantage on sugar plantations.

The American Bell Telephone Company is overrun with orders, and is licensing new companies daily. There is hardly a town in the Far West, of over 3,000, but has the system, and it is in much greater use than here, as many of the business men have it in their houses in addition to their offices.

The Fossil Meal Company, of New York, make a composition that is very durable, fireproof, and easily applied. The sales are rapidly increasing.

The new road cart made by Bradley & Co., of Syracuse, has proved a decided success, and large orders are being received daily.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at the office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their indentification.

(1) J. A. J. asks where aluminum can be bought and what it will cost. A. Aluminum can be purchased of most of the dealers in chemical apparatus or through any large wholesale druggist. Its value is about $2 00 per ounce. SCIENTIFIC AMERICAN SUPPLEMENT No. 35 gives quite a complete description of the metal. Its manufacture is again described on page 3906 of SCIENTIFIC AMERICAN SUPPLEMENT, No. 245. On page 19 of the SCIENTIFIC AMERICAN for January 18, 1883, will be found an English patented process of recent date.

(2) J. de W. C. asks formula for preparing boroglyceril, or that substance asserted to have the power of preserving flesh. A. Pure glycerine, 92 parts, is heated to 300° Fah., and boracic acid, 62 parts, which should be prepared to facilitate the reaction, is added. For further details, consult SCIENTIFIC AMERICAN SUPPLEMENT, No. 332, page 5293.

(3) J. B.—Elastic paint is simply an ordinary paint to which a little rubber dissolved in benzine has been added. 2. Add to an ordinary paint sufficient Japan drier or a little manganese borate, and you will have a "siccative paint."

(4) I. T. & F. D. S. ask the rule to figure amount of power by belt, size of pulley, and speed. A.

$$\frac{\text{W. S.}}{800} = \text{H. P.}$$

This for narrow belts, say below 6 inches. For wide belts make the denominator 600 instead of 800. 2. Please give us the usual rule for ascertaining how much power is being used in case of rental. A. There is no way of ascertaining, except by use of indicator or dynamometer. Formerly, says editor, had occasion to inquire of parties who rent power, and found they had *no rule*, but would say, "I will rent you power to drive that machine (whatever it may be) for so much;" the power can be approximated by the belt required to drive the machine.

(5) F. P. S. asks for a formula for coating cast iron a glossy black color; one that will stand washing and heat. A. Take oil of turpentine and add to it strong sulphuric acid, drop by drop, while stirring, until a sirupy precipitate is formed and no more of it is produced on further addition of a drop of acid. The liquid is now repeatedly washed away with water, every time renewed after a good stirring, until the water does not exhibit any more acid reaction with blue litmus paper. The precipitate is next brought upon a cloth filter, and after all the water has run off, the sirup is fit for use. This thickish deposit is painted over the iron with a brush; if it happens to be too stiff, it is previously diluted with some oil of turpentine. Immediately after the iron has been painted, the paint is burnt in by a gentle heat, and after cooling, the black surface is rubbed over with a piece of linen stuff dipped in and moistened with linseed oil. See also "Varnishes for Protecting Iron," SCIENTIFIC AMERICAN SUPPLEMENT, No. 226.

(6) A. A. D. asks how to make a solution in which, if paper be soaked, and then dried, it will turn blue on exposure to sunlight. A. Use the following: 1. Potassium ferricyanide, 1¼ ounces, dissolved in 8 ounces water. 2. Ammonium iron citrate, 1⅞ ounces, dissolved in 8 ounces water. These solutions are mixed, filtered, and preserved in a dark room. Soak the paper in the dark, expose to sunlight, and wash off excess of solution. According to the length of exposure the blue color will be more or less intense.

(7) D. W. W. writes: Years ago I made an excellent black ink with a quarter of a pound of extract logwood, 90 grains bichromate of potash, and 15 grains prussiate potash. I recently made a couple of gallons for sample, which after standing a few days became thick and ropy, with a scum on the surface. What is the trouble? A. Your receipt is one of the forms of what is known as Runge's ink, concerning which an English writer says: "An ink prepared from these ingredients is not affected by acids or water, is black, forms no deposit, and is not acted on, nor does it act on the pen in using. Unfortunately, after it has been prepared for a time, it gelatinizes, in which condition it is totally unfit for use, nor have means yet been devised to prevent this change or to restore it, once it has taken place." A copying ink can be made by the addition of a slight quantity of sugar or glycerine to any ink.

(8) J. C. G. asks what to apply to iron patterns to make them smooth and prevent them from rusting. A. Shellac varnish is sometimes used, but for a very fine pattern nothing is better than pure, hard yellow beeswax. Heat the pattern—preferably over a smoky fire of pine shavings. When sufficiently warm to melt the wax, apply the wax and allow the surplus to drain off. When the pattern is perfectly cold, smooth it with chisel shaped tools of hard wood, and lastly polish with a shoe brush.

(9) O. P. asks how to make indigo blue ink, such as used by paper rulers. A. 1. Dissolve basic or soluble Prussian blue in pure water. This is the most permanent and beautiful ink known. 2. Triturate to a perfectly smooth paste, six parts pure Prussian blue and one part oxalic acid, with a little water; then dilute with sufficient soft water to make it fluid. 3. Dissolve two-thirds ounce sulphate of indigo in 1 gallon of water.

(10) J. G. D. writes: Some time ago I put a piece of thin sheet brass between a magnet and a piece of steel (horse shoe magnet). The attractive power of the magnet for the steel was much diminished. Now, what I want to know is, what shall I put between the magnet and piece of steel to kill the attractive power of the magnet for the steel? A. The reason the brass diminished the magnetism is because the distance between the magnet and armature was increased. No insulator for magnetism has been discovered.

(11) A. E. W. asks: What is the best way to make carbon plates for batteries, other than sawing them from gas carbon? A. Select fine coke and pulverize it. Mix with it a small proportion of powdered bituminous coal. Ram into an iron mould. Place the mould in an iron box and surround it with powdered coke. Cover the box with an iron lid. Submit the box and contents to a red heat until the powdered bituminous coal is coked. Allow the box and contents to cool before opening. Remove the carbon, boil it in molasses thinned with water. Replace it in the box and surround it with powdered coke. Heat as before, and repeat this process until you are satisfied with the product.

(12) F. M. C. asks how to arrange an electric alarm clock. A. Place your battery and bell as you desire to have them. Lead the wires to the clock. Connect one of them with the clock movement, and connect the other with a light spring that the hour hand will touch when it reaches it in the course of its revolution.

(13) E. C. L. writes: I have a fifteen horse tubular boiler, located in a small addition to a two story frame building, which I contemplate heating with steam from this boiler. The water line in the boiler is situated 18 inches below the level of the first floor. Can I return the condensed water, which comes from the radiators, into the boiler without the assistance of a trap or any other mechanical appliances? A. It would not be very certain in its operation. Better trap off the water and return to boiler by pump or injector.

(14) W. M. B. asks: 1. How can I give or obtain a bright finish on walnut coffins, or furniture made of walnut, after neatly dressing with smoothing plane? A. Take pulverized asphaltum, put it in a jar or bottle, pour over it about twice its bulk of turpentine or benzol, put in a warm place and shake occasionally; when dissolved strain, and apply it to the wood with a cloth or stiff brush; should it prove too dark, dilute with turpentine or benzol. If desired to bring out the grain still more, apply a mixture of boiled oil and turpentine; this is better than oil alone. When the oil is dry, the wood can be polished with the following: Shellac varnish, 2 parts; boiled oil, 1 part; shake it well before using. Apply with a cloth, rubbing briskly. 2. How can I imitate walnut, as above of pine, of a dark brown or walnut color, with nice finish? A. Walnut stain: Water, 1 quart; washing soda, 1½ ounces; Vandyke brown, 2½ ounces; potassium bichromate, one-quarter ounce. Boil for ten minutes. Apply with a brush in either hot or cold state.

(15) J. D. G. asks: What would I gain by using an automatic cut-off engine when I use all the exhaust steam under a pressure of 8 pounds per square inch? I do not have enough exhaust. I admit live steam in the exhaust pipe when pressure falls below 8 pounds. If I use a plain slide valve engine and take steam seven-eighths of stroke, do I lose any when I use all the exhaust? A. If all the steam which passes through your engine is required for other purposes, the gain would be little if anything, by adding an automatic cut-off.

(16) C. P. R. asks what are the advantages and disadvantages of the two forms of rail now in use by street car companies, and known as the "side bearing" and "center bearing," and which form is considered best for ordinary traffic on a cedar block paved street? A. The side bearing rail is least obstructive to ordinary vehicles, and affords good facilities for wagons of all kinds to run on the flat web It is much preferred by vehicle owners. The center bearing rail is preferred by the railway companies. It is self-cleaning, stands a little higher, wagons cannot run on it, and so wear it out; it obstructs ordinary vehicles more than the side bearing rail.

(17) G. F. P. asks: How can I prevent giving out wet steam from a coil? A. Add a steam chamber or superheater.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

H. M. M.—1. Quartz containing mica and pyrite (probably nickeliferous). 2. Quartz with calcite and chondrodite. 3. Quartz with pyrite in rock.—W. N.—The specimens hardly resemble tin ore, and it would be impossible to express a positive opinion without first assaying them, the expense of which would be $5.00, and a larger quantity of the ore would be desirable for proper sampling.—S. B. E.—The specimen is quartz containing a little pyrite very finely divided, and may carry gold.—R. H. G.—The specific gravity of gold is 19·3 and that of lead is 11·38; hence gold is the heavier metal.

ERRATUM.—On page 298, SCI. AM., Nov. 10, 1883, Notes and Queries (57), $80 to $90, should read .80 to .90.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

October 30, 1883,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Adjustable reclining chair, D. W. Miller 287,769
Aerial railway, D. R. Olmsted 287,458
Ague, composition for, T. A. Wilson 287,602
Alarm. See Burglar alarm. Fire alarm.
Amalgamating apparatus, E. H. Gollings 287,431
Ammonia from bone-black retorts, apparatus for taking off, F. Osmer 287,570
Axle box, car, O. Pagan 287,572
Axle, vehicle, R. W. & W. Hubbard 287,438
Axle, wagon, J. & P. Horrmann 287,675
Bag fastener, C. W. Bradford 287,755
Bag or satchel, C. W. Jenks 287,680
Battery. See Electric battery.
Belts, tool for connecting and disconnecting the ends of, G. H. Clark 287,417
Bicycle, S. A. Potter 287,717
Bicycles, ball bearing for, A. E. Schaaf 287,476
Bit, E. Hall 287,538
Blind and shutter, H. L. Page 287,712
Block facing machine, J. Y. Simons 287,478
Board. See Ironing board.
Boiler. See Locomotive boiler.
Boiler and steam vacuum pump, combined, C. L. Riker 287,579
Bolting machine, centrifugal, F. Stetter 287,481
Box. See Axle box. Packing and storing box.
Brace. See Railway rail brace.
Breast strap fender, J. C. Look 287,696
Brick kiln, G. F. Cotton 287,683
Brick kiln, F. L. Hall 287,432
Brick, manufacture of, F. W. Meeker 287,699
Brush for cleaning milk cans, J. J. Quinn 287,719
Bucket, milk, Rogers & Wolf 287,726
Burglar alarm, detonating, W. H. Reiff 287,722
Can filling apparatus, A. Rockfellow 287,725
Candy heater, T. Burkhard 287,621
Car coupling, J. Brown 287,415
Car coupling, Brown & Poole 287,619
Car coupling, T. Gates 287,759
Car coupling, J. E. McMurtrey *et al* 287,455
Car coupling, R. T. Morrison, Jr 287,702
Car coupling, A. Muller 287,771
Car coupling, E. H. C. Tompkins 287,433
Car coupling, White & Ruddell 287,749
Car, dumping, W. Fullon 287,650
Car, dumping, J. T. Goodwin 287,663
Car replacer, J. T. Fosdick 287,528
Car replacer, W. Toombs 287,738
Car roofing, W. H. Paige 287,459
Car seat, street, W. Don 287,644
Car spring, N. H. Davis ..... 287,638 to 287,640
Car wheel, D. Connell 287,629
Car wheel truing machine, J. H. Gowan 287,762
Cars, plow for unloading, J. McMullin 287,698
Carbonizing mould, T. A. Edison 287,522
Carding machine, R. F. Barker 287,405
Carpet stretcher and tack driver, combined, Morris & Finck 287,562
Carriage jack, A. J. Church 287,625
Carriage top, H. M. Bowden 287,499
Carrier. See Trace carrier.
Cartridge closing machine, Leet & Northall 287,698
Cartridges, can for holding blasting, C. C. White 287,785
Case. See Extension case. Spectacle case. Type case.
Caster attachment to rockers, W. C. Ranney 287,721
Casting copper, apparatus for, Durfee & Eglestou 287,646
Chain for bracelets, etc., C. A. Müller 287,564
Chimney cap, F. H. Leonard 287,553
Clasp pivot pin, W. W. Anderson 287,605
Claw bar, Moore & O'Leary 287,561
Cleaner. See Track cleaner.
Clock pendulum, I. B. Woodruff *et al* 287,604
Clothes rack, J. H. French 287,655
Clothes wringer, C. K. Stinson 287,782
Cock, gauge, L. B. Fulton (r) 10,398
Collar rim plate, horse, W. L. Bellis 287,497
Colter, rolling, H. M. Skinner 287,733
Combing machine, I. Best 287,498
Copying composition, H. S. Myers 287,457
Cork puller or screw, F. Cappel 287,504
Corn sheller, G. Prichard 287,718
Corset clasp fastening, W. F. Gilbert 287,660
Cotton and hay press, W. D. Slauson 287,734
Coupling. See Car coupling. Shaft coupling.
Cover, pan, S. C. Dowdell 287,425
Cribbing plate, A. Quinque 287,577
Cultivator, W. A. Knowlton 287,443
Cultivator and harrow teeth, securing, E. Fulmer 287,531
Cultivator spring, J. B. Neff 287,703
Cup. See Salt and pepper cup.
Curtain roller, spring, L. L. Sawyer 287,729
Cutter. See Nail machine cutter.
Damper, F. C. Davis 287,637
Decorative fabric, E. Baron 287,495
Dental engine hand piece, J. W. Gilbert 287,761
Dental engine hand piece, W. A. Johnston *et al* 287,683
Desk, C. Ignatius 287,543
Desk, L. P. Ross 287,475
Detector. See Time detector.
Die press, G. E. Meeker 287,767
Dish cover, baking, A. A. Curtis 287,635
Dish draining rack, M. Raughtigan 287,471
Dredging machine, A. Cook 287,631
Dredging or excavating machine, H. E. Hawk 287,763
Drier. See Fruit drier.
Drill. See Grain drill.
Eccentric, C. W. Barnaby 287,406
Eccentric, C. Johnson 287,440
Electric alarms, circuit closer for, L. A. Brigel 287,618
Electric battery, A. F. Delafield 287,641
Electric circuits, safety catch for, C. Goddard 287,533
Electric distribution, system of, T. A. Edison 287,516
Electric generator, dynamo or magneto, F. Bain 287,608
Electric lighting systems, indicator for, W. P. Freeman 287,654
Electric machine, dynamo, F. Bain 287,609, 287,610
Electric machine, dynamo, T. A. Edison, 287,512 to 287,517
Electric machine, dynamo or magneto, F. Bain 287,611
Electric machine, dynamo or magneto, T. A. Edison 287,521, 287,523
Electric machine, dynamo or magneto, J. E. Giles 287,661
Electric machine, dynamo or magneto, P. P. Nungesser 287,774
Electric machine regulator, dynamo, T. A. Edison 287,524
Electric machine regulator, dynamo, G. J. Murdock 287,565
Electric machines, wiper for the commutators of dynamo, R. Holbon 287,678
Electric regulator, T. A. Edison 287,511
Electrical conductors, junction for, C. Goddard 287,532
Electrical distribution, regulator for systems of, Edison & Clarke 287,525
Electrical distribution, system of, T. A. Edison, 287,515, 287,517
Electrical testing, C. S. Bradley 287,501
Elevator. See Grain elevator. Safety elevator.
Elevator lock, Grover & Worden 287,668
Engine. See Gas engine. Gas or vapor engine. Road engine. Traction engine.
Evaporator, T. W. Weller 287,487
Evaporator for making sugar from saccharine juices, etc., O. B. Jennings 287,545
Excavating machine, W. S. Morton 287,563
Excavator, D. Harper 287,671
Extension case or box, W. Reets 287,473
Feather renovator, J. Baur 287,496
Fender. See Breast strap fender.
Fertilizers, packing and shipping, A. Edwards 287,526
Fifth wheel, vehicle, J. S. Klapperich 287,550
Fifth wheels, die and blank for the manufacture of, F. P. Bates 287,407
File blanks, machine for grinding and dressing, A. Weed 287,746
Filter, oil, Clark & Beecher 287,627
Fire alarm, A. & A. Iske 287,439
Fire alarm apparatus, electric, W. C. Gordon 287,664
Firearm, breech-loading, J. Turner 287,744
Firearm stock, G. R. Vickers, Jr 287,741
Fire escape, C. F. Bierbach 287,410
Fire escape, A. J. Heavner 287,540
Fire escape, C. Ives 287,764
Fire escape, J. A. Miller 287,560
Fire escape, N. J. Powell 287,467
Fire escape, W. H. Welsh 287,598
Fire escape, F. R. Woodward 287,491, 287,492
Fire indicator, thermostatic, R. N. Dyer 287,757
Fire kindler attachment for stoves and grates, C. F. Allis 287,402
Fireproof partition block, M. Lapersonnerie 287,552
Flatiron, electric, Dyer & Seely 287,758
Flax puller, A. C. Lamar 287,445
Folding table, J. Tull 287,739
Food, manufacture of medicated, C. I. Fleischoen 287,429
Foot power, H. W. Poss 287,716
Frame corner plate, H. M. Jones 287,441
Fruit drier, J. H. Hunter 287,542
Fruit picker, J. Sealamer 287,780
Furnace, L. P. French 287,656
Furnace and working the same, J. Henderson (r) 10,399
Furnace for glass factories, etc., J. D. Putnam 287,470
Furnaces, air injector for, J. W. Bonta 287,754
Furnaces, combustion device for steam boiler, W. Harman 287,670
Furnaces for receiving the dump, attachment for cupola, H. W. Fayette 287,527
Gauge. See Pressure gauge.
Gas and coke kiln, H. H. Hall 287,433
Gas engine, G. H. Reynolds 287,578
Gas or vapor engine, G. B. & W. B. Gray 287,666
Gaskets, machine for cutting oval, J. H. Burnett 287,508
Gate. See Railway crossing gate.
Gear wheel, B. F. Ortman 287,711
Generator. See Electric generator. Ozone generator. Steam generator.
Gilling and hackling machines, tooth for, W. Crabb 287,506
Glass products, manufacture of decorative, H. F. Miles 287,768
Governor attachment, steam engine, W. J. Buchanan 287,620
Grain binder, C. Lidren 287,694
Grain binding apparatus, C. Lidren 287,695
Grain cutting machine, R. L. Phelps 287,463, 287,464
Grain drill, A. & M. Runstetler 287,779
Grain elevator, W. Watson 287,595
Grain meter, Griffith & Ramsey 287,535
Grain screen, C. E. Gage 287,657
Grain separator, H. Campbell 287,750
Grinding and polishing machine, E. R. Ware 287,744
Grinding apparatus, portable, M. Lennon 287,447
Grinding roll feeder, G. B. Root 287,724
Gun barrels, machine for turning, C. A. King 287,548
Hair springs, manufacture of, J. Logan 287,448
Hame, J. A. Outlaw 287,571
Harrow and clod breaker, rotary, B. Smith 287,479
Hat bodies, machine for hardening and sizing, W. H. Behrens 284,752
Hatchway, elevator, W. Stevens 287,590
Hay and cotton press, E. C. Worthen 287,750
Hay and grain, apparatus for unloading, R. Griswold 287,667
Hay elevator track, J. Ney 287,772
Hay rake, horse, R. O. Bingham 287,613
Heater. See Candy heater.
Heel lifts and taps, manufacturing, G. A. White 287,488
Heel nailing machine, F. F. Raymond, 2d 287,472
Heeling machine, D. Whitlock 287,489
Holder. See Necktie and scarf holder. Rein holder. Scissors holder. Ticket holder. Umbrella holder. Whip and rein holder.
Hoop flaring machine, J. Z. Gifford 287,659
Horse checking and unchecking device, D. O. Cox 287,419
Hub, metallic, J. Douglass 287,645
Hydrant, fire, W. H. Leonard 287,554
Ice plows and markers, guide for, F. J. Fischer 287,428
Ice tongs, G. J. Dickson 284,423
Indicator. See Fire indicator.
Insect destroyer, A. Newkirk 287,704
Insulated electric conductor, G. W. McGill 287,766
Insulated electric conductor, H. O. Phillips 287,776
Iron. See Flatiron. Waffle iron.
Ironing board, P. F. Weber 287,596
Jack. See Carriage jack. Lifting jack.
Kettle for rendering fats, boiling soap, etc., jacketed steam, H. W. Dopp 287,424
Key rack, W. H. Camp 287,623
Kiln. See Brick kiln. Gas and coke kiln.
Lamp extinguisher, A. Koegel 287,689
Lamp, incandescing electric, T. A. Edison 287,519
Lamp, plummet, J. Roach 287,580
Lamp shades with silver, apparatus for coating, J. Dable 287,636
Lamps, incandescing conductor for electric, T. A. Edison 287,520
Lamps, manufacturing incandescing electric, T. A. Edison 287,518
Latch, door, E. N. Porter 287,715
Lathe, turning, G. D. Hayden 287,673
Lathe, wood turning, H. & J. Kelly 287,688
Letter sheet and envelope, combined, B. Loewenbach 287,555
Lifting jack, J. W. Hawkins 287,539

Lightning arrester, J. W. Dyer 287,647
Link bending machine, C. O. Sobinski 287,736
Liquid meter, D. B. Spooner 287,597
Lock. See Time lock.
Lock gates, apparatus for opening and closing, T. H. Pollock 287,575
Locomotive boiler, C. B. Coventry 287,505
Lubricating compound, G. Dimick 287,643
Magneto-electric machine, P. P. Nungesser 287,773
Manure distributer, V. M. Snow 287,735
Mechanical movement, W. H. Behrens 287,408
Mechanical movement, W. M. Phelps 284,574
Medicated effervescent salts, C. B. Shafer 287,781
Medicine, veterinary, T. L. Miller 287,701
Metal crimping tool, R. Whitaker 287,784
Metal, manufacture of Bessemer, W. R. Jones 287,687
Meter. See Grain meter. Rotary meter. Water meter.
Micrometer, S. Darling 287,420
Middlings purifier, C. Wehner 287,597
Mining machine, coal, W. Hilton 287,436
Mould. See Carbonizing mould.
Motor, M. L. Rison 287,777
Musical instrument, mechanical, E. Welte 287,599
Nail machine cutter, W. Wickersham 287,600
Neck wear shields, pin holder for, W. Fichtenberg 287,652
Necktie fastener, F. C. C. Kahler 287,442
Necktie or scarf holder, J. E. Vanderbilt 287,594
Netting, W. H. Boyd 287,616
Nippers, G. W. Hubbard 287,437
Nippers, cutting, J. Stevens 287,589
Nuts, process of and apparatus for cleaning, tinting, and polishing pecan and other, R. C. Koerber 287,690
Ore concentrator and amalgamator, F. M. Johnson 287,546
Ores, etc., machine for pulverizing, A. L. Fish 287,653
Ozone generator, W. A. Gay 287,760
Packing and storing box, A. J. Herring 287,435
Packing emery wheels, etc., for burning, apparatus for, Pulson & Snow 287,469
Packing piston, L. O. Hall 287,669
Packing, metallic wire, S. Armstrong 287,751
Packing, steam joints, R. A. Bulkley 287,416
Paint or coloring material to artists' academy boards, apparatus for the application of, E. H. Friedrichs 287,530
Paper bags, making, G. O. Blowers 287,753
Paper folding machines, sheet carrying and adjusting device for, T. C. Dexter 287,421
Paper machine, T. A. & J. Boyne, Jr 287,500
Paper stock, method of and apparatus for treating rags for, C. F. Taylor 287,482
Parer, apple, J. L. Wilcox 287,601
Pattern for cutting dress patterns, M. S. Schafer. 287,731
Peat for fuel, etc., apparatus for preparing and treating, J. B. Hyde 287,679
Picker. See Fruit picker.
Pin. See Clasp pivot pin.
Pitmen off dead centers, spring for keeping, C. A. Van Allen 287,485
Plane, H. B. Beach 287,612
Plane, S. R. & A. E. Rust 287,584
Planter check rower, corn, McKinniss & Litterer. 287,454
Planter, hand seed, G. B. Clark 287,626
Plow, H. Rauths 287,720
Plow, gang, T. L. Grigsby 287,536
Plow jointer, G. S. Roberts 287,778
Plumber's trap, F. N. Du Bois 287,510
Pole, carriage, C. M. Blydenburgh 287,412
Power. See Foot power.
Power converter, H. Croft, Jr 287,634
Press. See Die press. Hay and cotton press.
Pressure gauge, recording, F. A. Jones 287,665, 287,666
Pressure gauge, recording, Jones & Glines 287,684
Printer's galley, N. Roemer 287,581
Printing press inking apparatus, J. W. Osborne 287,569
Printing presses, paper folding, pasting, and trimming attachment for, T. C. Dexter 287,422
Puller. See Corn puller. Flax puller. Weed puller.
Pulley, roller, or friction wheel, J. W. Osborne 287,567
Pulley, roller, or wheel, J. W. Osborne 287,568
Pulp machine for forming hollow ware from wood, J. G. Bodge 287,614
Pulverizing machine, R. D. Gates 287,658
Pump, P. T. Perkins 287,461
Pump, centrifugal, N. Didiot 287,508
Pump, measuring, H. E. Marchand 287,697
Pumping artesian wells, machine for, T. Korner 287,444
Rack. See Clothes rack. Dish draining rack. Key rack
Radiator, steam, S. H. Morrill 287,770
Railway crossing gate, E. J. Henkle 287,674
Railway heads, evener for, A. Schaer 287,585
Railway rail brace, M. R. Perkins 287,573
Railway signal, electric, W. W. Le Grande 287,446
Railway signals, electrical connection for, T. J. Pottinger 287,466
Railway track clearer, G. Royal 287,583
Railway tracks, device for connecting portable, J. J. Clarke 287,418
Rake. See Hay rake.
Refrigerator, G. Koons 287,691
Regulator. See Electric regulator. Electric machine regulator.
Rein holder, vehicle, D. McDougald 287,556
Riveting machine, J. R. Connor 287,630
Riveting machine, J. L. Saxe 287,730
Road engine, B. F. Opp 287,709
Roller. See Pulley roller.
Roof valley, sheet metal, C. B. Cooper 287,632
Rotary meter, H. Fredrick 287,529
Rubber plates or sheets for graining, preparing, H. C. Brainerd 287,617
Ruler, metal, C. A. Smith 287,480
Safe, burglar proof, J. White 287,787
Safety elevator, J. W. King 287,549
Sail, E. Pinkham 287,465
Sails, reefing and furling fore-and aft, T. O'Brien 287,707
Salt and pepper cup, combined, T. B. Cleveland 287,628
Sandal or shoe, anti-slipping, J. W. White 287,748
Sash fastener, F. Bell 287,409
Sash fastener, E. R. Wethered 287,747
Saw, gin, C. W. Mann 287,450
Scale, bagger, and register, combined grain, Leach & Olds 287,692
Scissors holder, M. A. Warne 287,745
Seat. See Car seat.
Separator See Grain separator.
Sewer trap, J. Bodine 287,414
Sewing machine, J. W. Post 287,576
Sewing machine back stop, C. A. Van Allen 287,484
Sewing machine, single thread, Thimonnier, Fils, & Vernay 287,592
Shaft attachment for vehicles, G. W. Prior 287,468
Shaft coupling, A. Faust 287,651
Sheller. See Corn sheller.
Shingle sawing machine, W. J. Perkins 287,462
Signal. See Railway signal.
Skate, roller, O. Arnold 287,607
Skeins of silk, method of and appliance for locking separate, J. & J. Nightingale 287,705
Sled, H. H. Miller 287,700
Soap, medicated, J. J. Dillard 287,642
Sodium carbonate, making, C. Knab 287,551
Spectacle case and pencil holder, Pattee & Scovell 287,460
Spigot, G. W. Evans 287,427
Spittoon, C. Gordon 287,534
Spool or bobbin, C. Elikan 287,426
Spout, sap, D. C. Brown 287,414
Spring. See Car spring. Cultivator spring. Vehicle spring.
Stave baling machine, C. A. Harris 287,672
Steam generator, G. W. McAllister 287,452
Steam generator, magazine or base burning, W. H. Wilson 287,603
Stone smoothing machine, J. Eger 287,648
Stove, C. Mattice 287,565
Stove, G. W. McAllister 287,453
Stove grate, J. Hahn 287,537
Stovepipe elbow, J. P. Barker 287,494
Stoves, etc., oil reservoir for oil, S. T. McDougall. 287,557
Stump pulling machine, O. A. Anthony 287,606
Sugar from sugar cane, sorghum, maize, etc., manufacture of, O. B. Jennings 287,544
Sulky, adjustable frame, J. Caley 287,622
Sulphides, treating, C. A. Stetefeldt 287,737
Syringe, vaginal, C. L. Jensen 287,681
Table. See Folding table.
Telephone receiver, H. E. Waite 287,742
Telephone receiver, Waite & Bartlett 287,743
Telephone time signal repeating system, J. M. Oram 287,710
Telephone transmitter, E. L. Wilson 287,490
Telephonic repeater and relay, J. A. Maloney 287,449
Thrasher and separator, grain, O. O. Graves 287,665
Ticket holder, W. B. Van Amringe 287,486
Tiles, device for handling drain, J. Ross 287,727
Time detector, electric, T. Ahearn 287,401
Time lock, electric, W. E. Peirce 287,775
Timepieces, winding indicator for, B. F. Mersmann 287,559
Top, J. H. Sunderman 287,591
Toy gun, Curtis & Lewis 287,507
Toy pistol, J. H. Rose 287,582
Trace carrier, C. F. Miller 287,456
Track cleaner, Birnbaum & Richmond 287,411
Traction engine, G. A. Thode 287,593
Trap. See Plumber's trap. Sewer trap.
Tricycle, T. O'Brien 287,566
Tricycle, railway, H. K. Shanck 287,732
Trimmings, etc., former for dress, E. H. Godshalk 287,662
Tucked fabric, machine for finishing, N. E. Borden 287,615
Tunneling machine, M. Rothschild 287,728
Type case, W. H. Golding 287,480
Umbrella case fastener, W. P. Richards 287,474
Umbrella holder, F. S. Hesseltine 287,676
Underground conduit, J. S. Du Bois 287,509
Valve, steam actuated, T. Northey 287,706
Vehicle spring, V. M. Backus 287,404
Ventilation, A. J. Hendry 287,434
Ventilator, W. Schmols 287,477
Vessels, apparatus for raising sunken, H. Schuyler 287,586
Voting machine for legislative bodies, electric, J. A. Enos 287,649
Vulcanizing and celluloid apparatus, G. P. Bishel 287,723
Waffle iron, A. G. Patton 287,713
Wagon bodies, device for lifting, J. B. Brickhouse 287,502
Wagon, dumping, C. Kaeppel 287,547
Wagon, platform, P. Huff 287,541
Water closet, S. G. McFarland 287,558
Water meter, D. B. Spooner 287,568
Water wheel turbine, H. R. Austin 287,408
Weed puller, Higinbotham & Ball 287,677
Well point, drive, O. B. Olmsted 287,708
Wheel. See Car wheel. Fifth wheel. Gear wheel. Water wheel.
Whip and rein holder, combined, F. C. Ayer 287,493
Wire barbing machine, E. P. Peacock 287,714
Wire barbing machine, D. C. Stover 287,783
Wire rope grip, A. H. Mathesius 287,451
Wool, etc., process of and apparatus for extracting oil, fat, and oily and fatty matters from, T. J. Mullings 287,786
Wringer. See Clothes wringer.
Wrought and sheet iron vessel, J. Chaumont 287,624
Yoke for draught animals, E. L. Johnson 287,682

DESIGNS.

Cockeye, clip, G. F. Eberhard 14,374
Fireplace back, Jackson & Hankinson 14,378
Fireplace casing, A. Osborne 14,385
Fireplace casings, facing for, A. Osborne 14,383
Fireplace facing, A. Osborne 14,382, 14,384
Fireplace or grate, Jackson & Hankinson 14,379
Lamp chimney, H. Dietrich 14,378
Picture frame moulding, E. Fillmann 14,375, 14,376
Rug, R. P. Hemming 14,377
Rug, A. Petzold 14,386, 14,387
Skirt, lady's walking, C. O'Hara 14,381
Wrap, lady's, C. O'Hara 14,380

TRADE MARKS.

Bitters, H. Meinhard 10,684
Bitters, H. H. Warner 10,687
Bitters, tonic, H. H. Warner 10,688, 10,689
Burning fluids, J. G. Gorrell 10,680
Calcimine, W. B. Price 10,686
Cigars, Austin, Nichols & Co 10,685
Cigars and smoking and chewing tobacco, Chamberlain, Dewatoe & Co 10,679
Cigars, Havana, M. Irrmann 10,682
Horseshoe nails, Ausable Horse Nail Company 10,676
Liquors and cordials, A. V. Ardura 10,675
Medicine, certain proprietary, C. A. Higgins 10,681
Medicine, certain proprietary, P. M. Way 10,690
Pulley blocks H. Loud 10,683
Tobacco, chewing and smoking, Berry Bros 10,677
Wine, champagne, J. Bollinger 10,678

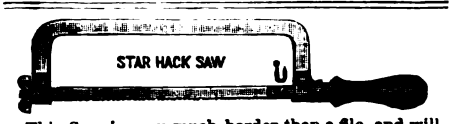
A printed copy of the specification and drawing of any patent in the foregoing list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired, and remit to Munn & Co., 261 Broadway, New York. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications, not being printed, must be copied by hand.

Canadian Patents may now be obtained by the inventors for any of the inventions named in the foregoing list, at a cost of $40 each. For full instructions address Munn & Co., 261 Broadway, New York. Other foreign patents may also be obtained.

Advertisements.

Inside Page, each insertion - - - 75 cents a line.
Back Page, each insertion - - - $1.00 a line.
(About eight words to a line.)

Engravings may head advertisements at the same rate per line, by measurement, as the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.



This Saw is very much harder than a file, and will cut Iron and Steel almost as readily as wood. One saw will cut off a bar of half-inch round iron eighty times, or a bar of untempered steel forty times. It cuts ten times as fast as a file, and at one-tenth the cost. As it cuts everything, it will do most of the sawing required about a house, shop or farm.

The Frame is made of Steel, polished and Nickel Plated, and will face the saw in four different directions. Frame and 12 Saws sent by mail on receipt of $1.50. Hardware dealers will furnish them at the same price. All genuine goods are marked with a Star, and bear our name—

Millers Falls Co.,
74 Chambers St., New York.

COLUMBIA BICYCLES AND TRICYCLES.

New Illustrated (36 page) Catalogue, giving full description of these machines, sent for 3 cent stamp.
THE POPE M'F'G CO.,
597 Washington St., Boston, Mass.

FOSSIL MEAL COMPOSITION,
The Leading Non-Conducting Covering
FOR BOILERS, PIPES, ETC.

With ¾ to ¾ inch thickness it radiates less heat than any other covering does with 2 inches.
Weighs very light, is very durable, fireproof, and is easily applied. Sold in a dry state by the pound.
FOSSIL MEAL CO., 48 Cedar St., New York.

SPEAKING TELEPHONES.
THE AMERICAN BELL TELEPHONE COMPANY,
W. H. FORBES, *President.* W. R. DRIVER, *Treasurer.* THEO. N. VAIL, *Gen. Manager.*

Alexander Graham Bell's patent of March 7, 1876, owned by this company, covers every form of apparatus, including Microphones or Carbon Telephones, in which the voice of the speaker causes electric undulations corresponding to the words spoken, and which articulations produce similar articulate sounds at the receiver. The Commissioner of Patents and the U. S. Circuit Court have decided this to be the true meaning of his claim; the validity of the patent has been sustained in the Circuit on final hearing in a contested case, and many injunctions and final decrees have been obtained on them.

This company also owns and controls all the other telephonic inventions of Bell, Edison, Berliner, Gray, Blake, Phelps, Watson, and others.

(Descriptive catalogues forwarded on application.)

Telephones for Private Line, Club, and Social systems can be procured directly or through the authorized agents of the company.

All telephones obtained except from this company, or its authorized licensees, are infringements, and the makers, sellers, and users will be proceeded against.

Information furnished upon application.

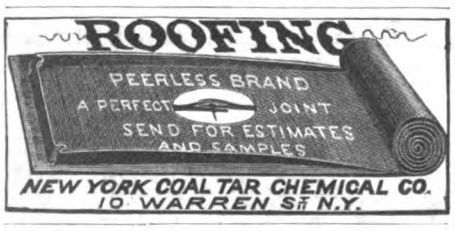
Address all communications to the
AMERICAN BELL TELEPHONE COMPANY,
95 Milk Street, Boston, Mass.

ROOFING
SEND FOR SAMPLE AND CIRCULAR
W. H. STEWART
74 COURTLAND, ST. NEW-YORK.

TOOPE'S PATENT
Asbestos Lined Removable Covering,

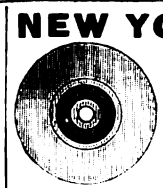
Made of Felt and Asbestos. For use on STEAM BOILERS and PIPES, Refrigerators, Meat Cars, Ice Houses, and HOT and COLD WATER PIPES. Easily applied by any one.
Address CHALMERS-SPENCE CO.,
419 & 421 8th St., New York.

H.W.JOHNS'
ASBESTOS
ASBESTOS ROPE PACKING,
ASBESTOS WICK PACKING,
ASBESTOS FLAT PACKING,
ASBESTOS SHEATHINGS,
ASBESTOS GASKETS,
ASBESTOS BUILDING FELT.
Made of strictly pure Asbestos.
H. W. JOHNS M'F'G CO.,
87 Maiden Lane, New York,
Sole Manufacturers of H. W. Johns' Genuine
ASBESTOS LIQUID PAINTS, ROOF PAINTS, ROOFING, STEAM PIPE AND BOILER COVERINGS, FIREPROOF COATINGS, CEMENTS, ETC.
Descriptive price lists and samples free.



ROOFING.
For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free. Agents Wanted. T. NEW, 32 John Street, New York.

NEW YORK BELTING AND PACKING COMP'Y.
The Oldest and Largest Manufacturers of the Original
SOLID VULCANITE
EMERY WHEELS.



Emery Wheel.
All other kinds Imitations and Inferior. Our name is stamped in full upon all our standard BELTING, PACKING, and HOSE. Address
JOHN H. CHEEVER, Treas. NEW YORK BELTING AND PACKING CO.,
Nos. 13 & 15 Park Row, opp. Astor House, New York.

EVAPORATING FRUIT

American Fruit Drier.
Treatise on improved methods SENT FREE. Wonderful results. Tables of Yields, Prices, Profits, and General Statistics. Address
AMERICAN MANUF'G CO.,
Waynesboro, Pa.

ESTABLISHED 1841
JOHN HOLLAND,
Manufacturer of

GOLD PENS,
Pen Holders, Pencil Cases, MacKinnon Stylographic and Elastic Fountain Pens. Over one million of our Gold Pens now in use, many of them more than twenty years old. If not sold by your stationer or jeweler, send for illustrated price list to 19 West 4th St., Cincinnati, O.

PATENT
JACKET KETTLES,
Plain or Porcelain Lined. Tested to 100 lb. pressure. Send for Lists.
JAMES C. HAND & CO.,
614 and 616 Market St., Philadelphia, Pa.

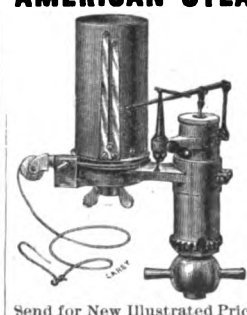
THE POOLEY ROTARY STEAM ENGINE.
This engine is designed for all purposes where the use of steam power is desired. It is simple, compact, and durable in construction; quick, positive, and powerful in its action. Address
W. C. POOLEY, Louisville, Ky.

BOGARDUS' PATENT UNIVERSAL ECCENTRIC MILLS—For grinding Bones, Ores, Sand, Old Crucibles, Fire Clay Guanos, Oil Cake, Feed, Corn, Corn and Cob, Tobacco, Snuff, Sugar, Salts, Roots, Spices, Coffee, Cocoanut, Flaxseed, Asbestos, Mica, etc., and whatever cannot be ground by other mills. Also for Paints, Printers' Inks, Paste Blacking, etc. JOHN W. THOMSON, successor to JAMES BOGARDUS, corner of White and Elm Sts., New York.

ROCK BREAKERS AND ORE CRUSHERS.
We manufacture and supply at short notice and lowest rates, Stone and Ore Crushers containing the invention described in Letters Patent, issued to Eli W. Blake, June 15th, 1858, together with NEW AND VALUABLE IMPROVEMENTS, for which Letters Patent were granted May 11th and July 20th, 1880, to Mr. S. L. Marsden. All Crushers supplied by us are constructed under the superintendence of Mr. Marsden, who, for the past fifteen years, has been connected with the manufacture of Blake Crushers in this country and England.
FARREL FOUNDRY AND MACHINE CO., Manufrs., Ansonia, Conn.
COPELAND & BACON, Agents, New York.

WM. A. HARRIS.
PROVIDENCE, R. I. (PARK STREET),
Six minutes walk West from station.
Original and Only builder of the
HARRIS-CORLISS ENGINE
With Harris' Patented Improvements,
from 10 to 1,000 H. P.

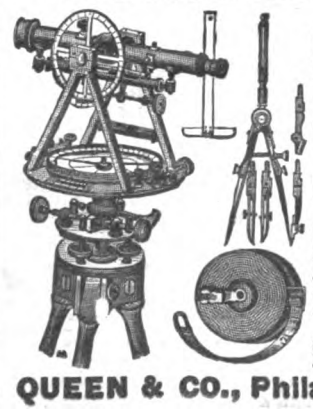
AMERICAN STEAM GAUGE CO.,



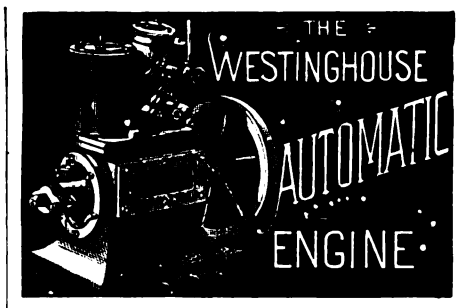
Original Steam Gauge Co.
Bus. Estab. in 1851.
Incorporated in 1854.
Sole Manufacturers of the
IMPROVED
THOMPSON
INDICATOR
PLANIMETER AND PANTOGRAPH.
36 Chardon St.,
BOSTON, MASS.
Send for New Illustrated Price List and name this paper.
J. C. BLAISDELL, Prest.
E. BURT PHILLIPS, Treas. H. K. MOORE, Supt.

M'F'G OPTICIANS.
SURVEYING INSTRUMENTS:
Transits, Levels, Compasses, Rods, Chains, Tapes.
DRAWING INSTRUMENTS,
Separate and in cases. Scales, Angles, Curves, T-squares, Microscopes, Telescopes, Opera and Field Glasses, Magic Lanterns, Aneroid and Mercurial Barometers, Self-registering Thermometers, Hygrometers, Hydrometers, Air Meters, Pedometers, Odometers, Rhumkorff Coils, Batteries, Magnets, etc. Send for and specify (SA-catalogue), 192 pages.

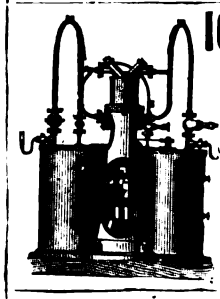
MATHEMATICAL INSTRUMENTS



AND
Drawing Materials
The Largest
AND
BEST STOCK
IN THE
United States
Prices and Illustrated Catalogue of 195 pages sent on application.
—ALSO—
Sample Books of Drawing Papers.
QUEEN & CO., Philadelphia



Automatic Engines, 30 to 300 Horse Power.
Throttling Engines, 4 to 100 Horse Power.
Over 450 Engines and 10,000 Horse Power now in use.
Send for Illustrated Circular and Reference List, and
ASK OUR PRICES!
The Westinghouse Machine Co.,
PITTSBURG, PA.
Address, if more convenient, our Branch Offices: 94 Liberty St., NEW YORK, 14 South Canal St., CHICAGO, 401 Elm St., DALLAS, TEXAS.



ICE MACHINES
Of all sizes, from
10 lb. per Hour to 50 Tons per Day
Binary Absorption System.
ECONOMICAL.
SIMPLE, RELIABLE.
Send for Circulars.
Delamater Iron Works,
16 Cortlandt St.,
NEW YORK, U. S. A.

Our Immense CATALOGUE of MUSICAL and other Wonders IS WORTH SENDING FOR FREE
HARBACH ORGANINA CO. Phila. Pa

Print Your Own Cards Labels, Etc., with our $3 Printing Press. Larger sizes for circulars, etc., $8 to $75. For young or old, business or pleasure. Everything easy, printed directions. Send two stamps for Catalogue of Presses, Type, Cards, etc., etc., to the factory, Kelsey & Co., Meriden, Ct.

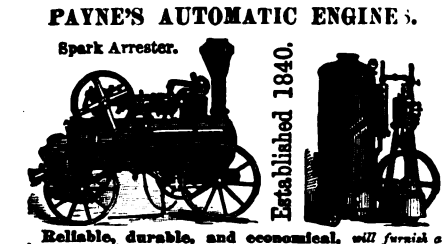
Useful Information and Tables on Steam and Water for Engineers and others contained in Blake's new illustrated catalogue of steam pumps and pumping engines, just published. Copies sent free. Address Geo. F. Blake Mfg. Co., 95 & 97 Liberty St., New York.

BOOKS ON BUILDING, PAINTING,
Decorating, etc. For 1883 eighty-eight-page illustrated Catalogue, address, inclosing three 3-cent stamps,
WM. T. COMSTOCK, 6 Astor Place, New York.

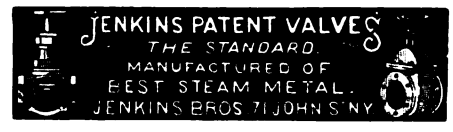
Leffel Water Wheels,
With Important Improvements.
11,000 IN SUCCESSFUL OPERATION.
FINE NEW PAMPHLET FOR 1883
Sent free to those interested.
JAMES LEFFEL & CO.,
Springfield, Ohio.
110 Liberty St., N. Y. City.

VOLNEY W. MASON & CO.,
FRICTION PULLEYS, CLUTCHES, and ELEVATORS,
PROVIDENCE, R. I.

PAYNE'S AUTOMATIC ENGINES.
Spark Arrester.

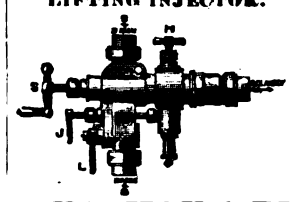


Reliable, durable, and economical, *will furnish a horse power with one-third less fuel and water than any other engine built,* not fitted with an automatic cut-off. Send for Illustrated Catalogue "A 2" for information and prices. Box 1207
B. W. PAYNE & SONS, Corning, N. Y.



Pyrometers. For showing heat of Ovens, Hot Blast Pipes, Boiler Flues, Superheated Steam, Oil Stills, etc.
HENRY W. BULKLEY, Sole Manufacturer,
149 Broadway, New York.

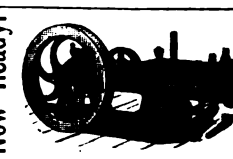
The "MONITOR."
A NEW LIFTING AND NON-LIFTING INJECTOR.



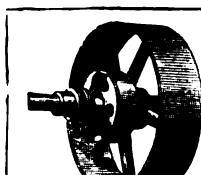
Best Boiler in the World. Greatest Range yet obtained. Does not Break under Sudden Changes of Steam Pressure.
Also Patent
EJECTORS
OR
Water Elevators.
For Conveying Water and Liquids.
Patent Oilers, Lubricators, etc.
NATHAN & DREYFUS,
Send for catalogue. 92 & 94 Liberty St., New York.

HARTFORD
STEAM BOILER
Inspection & Insurance
COMPANY.
W. B. FRANKLIN, V. Pres't. J. M. ALLEN, Pres't.
J. B. PIERCE, Sec'y.

Gas Engines, ½ & 1 H. P., Now Ready.



For Power or For Pumping
GAS ENGINES,
Simple, Substantial, Safe, Economical.
POWER DETERMINED BY ACTUAL TEST.
Call and see them, or for circulars and prices address
THE CONTINENTAL GAS ENGINE CO.,
No. 231 BROADWAY, NEW YORK.



F. Brown's Patent
FRICTION CLUTCH.
Send for Illustrated Catalogue and Discount Sheet to
A. & F. BROWN, 43 Park Place, New York.

OF THE
Scientific American
FOR 1883.
The Most Popular Scientific Paper in the World.

Only $3.20 a Year, including postage. Weekly. 52 Numbers a Year.

This widely circulated and splendidly illustrated paper is published weekly. Every number contains sixteen pages of useful information, and a large number of original engravings of new inventions and discoveries representing Engineering Works, Steam Machinery, New Inventions, Novelties in Mechanics, Manufactures, Chemistry, Electricity, Telegraphy, Photography, Architecture, Agriculture, Horticulture, Natural History, etc.

All Classes of Readers find in the SCIENTIFIC AMERICAN a popular *resume* of the best scientific information of the day; and it is the aim of the publishers to present it in an attractive form, avoiding as much as possible abstruse terms. To every intelligent mind this journal affords a constant supply of instructive reading. It is promotive of knowledge and progress in every community where it circulates.

Terms of Subscription.—One copy of the SCIENTIFIC AMERICAN will be sent for *one year*—52 numbers—postage prepaid, to any subscriber in the United States or Canada, on receipt of three dollars and twenty cents by the publishers; six months, $1.60; three months, $1.00.

Clubs.—One extra copy of the SCIENTIFIC AMERICAN will be supplied gratis *for every club of five subscribers* at $3.20 each; additional copies at same proportionate rate.

One copy of the SCIENTIFIC AMERICAN and one copy of the SCIENTIFIC AMERICAN SUPPLEMENT will be sent for one year, postage prepaid, to any [illegible] in the United States or Canada, on receipt of [illegible] by the publishers.

The safest way to remit is by Postal Order, Draft, or Express. Money carefully placed inside of envelopes securely sealed, and correctly addressed, seldom goes astray, but is at the sender's risk. Address all letters and make all orders, drafts, etc., payable to

MUNN & CO.,
261 Broadway, New York.

To Foreign Subscribers.—Under the facilities of the Postal Union, the SCIENTIFIC AMERICAN is now sent by post direct from New York, with regularity, to subscribers in Great Britain, India, Australia, and all other British colonies; to France, Austria, Belgium, Germany, Russia, and all other European States; Japan, Brazil, Mexico, and all States of Central and South America. Terms, when sent to foreign countries, Canada excepted, $4, gold, for SCIENTIFIC AMERICAN, one year; $9, gold for both SCIENTIFIC AMERICAN and SUPPLEMENT for one year. This includes postage, which we pay. Remit by postal order or draft to order of

MUNN & CO., 261 Broadway, New York.

PRINTING INKS.
THE "Scientific American" is printed with CHAS. ENEU JOHNSON & CO.'S INK. Tenth and Lombard Sts., Phila., and 47 Rose St., opp. Duane St., N. Y.